

# BELL LABORATORIES RECORD

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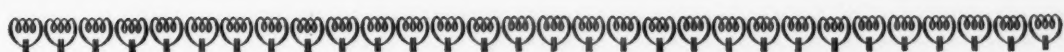


FOR HIGH ACHIEVEMENT  
IN THE PRODUCTION  
OF WAR EQUIPMENT

*Awarded to Bell Telephone Laboratories*  
SEPTEMBER 16, 1942



*Displaying the Production Award pennant to the audience: Dr. Buckley, Miss Freeman and Mr. Weil*



## Army-Navy Production Award Presented to the Laboratories

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**C**ONFERRED upon the Laboratories "for high achievement in the production of war equipment" and on each member of the organization for "high service to America," the Army-Navy Production Award was presented by Army and Navy officers on September 16 in ceremonies witnessed by about 400 members of the Laboratories. Following an orchestral overture and the singing of the national anthem by Miss Yolla Galli, Vice President Blackwell opened the ceremonies in the following words:

"When the notification of the Army-Navy Production Award was received at the Laboratories, it was first proposed to bring together, somewhere in New York City, practically the whole Laboratories membership. With three-quarters of the Laboratories people working in a congested city and the remaining one-quarter spread over several locations in New Jersey, a meeting of this kind would have been a particularly heartening experience. Simple figuring indicated, however, this would mean a loss of more than 12,000 man-hours of work and incidentally would require some 3,500 miles of bus travel—surely not a fitting response to an award for production in wartime. Reluctantly, therefore, the plans were changed to bring them within the compass of this auditorium.

"The approximately 400 Laboratories people who are here today have been selected to represent proportionately each of the Laboratories locations and proportionately all the different types of work carried out in the Laboratories. When I look into your faces, therefore, I see not 400 people—I see the 2,300 members of the technical, patent and Laboratories staff, the nearly 1,300 craft and plant members, the approximately 1,200 clerical workers, the 600 draftsmen, the 400 technical and staff assistants, the others who make up a total of over 5,800 people.

"A description of these ceremonies, the words spoken and the pictures taken, will be sent to each member of the Laboratories. We trust that each of you will carry, in a more personal way, to those with whom you work, something of the inspiration of this meeting.

"Emergencies have a way of bringing people closer together. The great emergency which now confronts the nation has led to the setting up of many contacts and friendships between the people of the Laboratories and those



*Colonel Corput presents the pennant to Dr. Buckley*

of other organizations quite outside of our normal spheres. This is particularly true of the Laboratories contacts with the armed forces of the United States.

"Colonel Rex V. D. Corput, in charge of the Signal Corps Radar Laboratories at Belmar, N. J., is here today as the representative of the Army of the United States. We recognize him also as an acquaintance and friend of many of the people in the Laboratories. It is a special pleasure to us that he has been designated to act for the Army on this occasion in presenting the Army-Navy 'E' flag.

"In addition to the flag, the award consists of a lapel pin, 'symbol of high

service to America,' for every member of the organization. The Navy is represented here today by Lieutenant John D. Lodge, U.S.N.R. of the Third Naval District. It is a great pleasure to know Lieutenant Lodge and to have him with us to carry out the second part of the ceremonies—the presentation of the lapel pins to the representatives of the Laboratories.

"In order not to interrupt the ceremonies which will now proceed, I will at this time give you the names of all of those who will be involved.

"After Colonel Corput's message, the flag will be held for a moment by these representatives of the Laboratories: Dr. O. E.

Buckley, President; Mr. Eric Weil, President of the Bell Telephone Laboratories Employees Association, Miss Eleanor L. Freeman, representing the women of the Laboratories. Lieutenant Lodge will present pins to all of the Laboratories representatives who are with us on the stage, including, in addition to those involved in the flag ceremony, Dr. F. B. Jewett, Chairman of the Laboratories Board, and Mr. Franklin A. Korn, a member of the Laboratories Technical Staff.

"Dr. O. E. Buckley, leader of the Laboratories in these perilous times—giving also of his abilities to important outside war activities, will speak first in acceptance of the award."



*At this point Mr. Blackwell presented Colonel Corput, who is in charge of the Signal Corps Radar Laboratory at Camp Evans. Colonel Corput said:*

"I have the honor of having been designated by the Under Secretary of the Navy, J. A. Forrestal, and the Under Secretary of War, Robert Patterson, to present to the Bell Telephone Laboratories the Army-Navy 'E' award. The work of the Bell Telephone Laboratories in times of peace is known to all. It is a known fact that this laboratory is in a large measure responsible for the complete communication system that exists throughout the world today; that working along this line of endeavor there have been many important side developments that have been of extreme benefit to this country in times of peace. This same work that you did in times of peace, of course, is one of the things that permits the country to function in times of war. Without the communication system the war would not be possible. However, even before the war started, years before, the Bell Telephone Laboratories had undertaken and carried on to a successful completion a great many development projects of one kind or another for the armed forces, both the Ordnance Department of the Army, Ordnance Department of the Navy and of communication personnel of both branches. I personally have been doing business with this

organization for well over five years. When the war started the load on Bell Telephone Laboratories increased. They were asked to produce new equipment, completely new equipment, which was only a dream in somebody's mind that turned into a crystallized, useful unit and do it in months whereas normally development work of that type requires years. I have seen the results of this development work. I have seen new equipments for the Army and Navy, some of them for my own particular laboratory, come out of this organization months and months before



*Lieutenant Lodge presents the "E" pin to Miss Freeman, while Mr. Weil and Mr. Korn look on*

anyone would have a reasonable right to expect them. You all know that for every soldier we send to the front there are a great many people behind the front line whose activities are necessary that that soldier can carry on his job. I have heard it stated that it takes 18 people behind the line for every soldier in it. The soldiers in the front line realize that they are dependent on people like you to produce the equipment they need at the time they need it. The jobs the Bell Telephone Laboratories have been doing have been delivered on time or ahead of time and in a form suited for the use of troops. You have been fighting your share of the battle here and fighting it very successfully. The armed forces appreciate the work that has been done. This award is being presented today as a token of the appreciation of the armed forces for you people who may be called the army behind the lines,

whose efforts are just as important as if you were firing guns in the front line and we know that this good work of yours will continue. This carrying on the good work will in due time receive recognition because some six months from now this organization will be again considered for an award and in all probability will receive a six-month star to place on your Army-Navy 'E' banner. One of the things that go with this award is the presentation of an 'E' pin to each individual of the Bell Telephone Laboratories who is entitled to wear such a pin and should wear it. It is a badge which shows the people of this country both in the armed forces and among civilians that you are one member of a group who is putting their efforts over the top.

"Dr. Buckley, as representative of the Bell Telephone Laboratories, it is a great pleasure to present to you the Army-Navy 'E' award."

*Colonel Corput then handed the flag to President Buckley, who holding one end, passed the other to Mr. Eric Weil, President of the Bell Telephone Laboratories Employees Association, and the center to Miss Eleanor L. Freeman, representing the women of the Laboratories. After thus presenting the flag for a short interval, Miss Freeman and Mr. Weil hung the flag at the back of the platform directly below the national emblem and waited for a moment while a fanfare of trumpets was sounded.*

*Lieutenant Lodge, as a prelude to the presentation of the pins, said:*

"Fellow soldiers! I call you fellow soldiers because that is exactly what you are. Without you we would be an army without guns, a navy without ships, and an air force without planes; but with you, management and labor, the Army, the Navy and the Air Force make up the All-American team. By your deserving this 'E' Award, you have shown that you have the makeup of soldiers. And, therefore, I feel that I can talk to you straight from the shoulder. Some of you may have read Ambassador

Grew's statement at an 'E' Award at Bridgeport, Conn. He said, 'Let us make no mistake. This is it. This is the real thing. This is being played for keeps.'

"I don't believe that most Americans take this war seriously enough. I don't believe most of us really realize what we stand to lose. We stand to lose our institutions; we stand to have our possessions confiscated, our scholars wiped out, our women defiled, and our men enslaved. That happened to every single country

that didn't know how to defend itself and there is no reason why it won't happen here unless we know how to keep it away. There has been a tendency in this country to think of the two oceans as a sort of super-Maginot Line. We think—well, they may have it a little tough over there but they will never be able to attack us here on the continent. That is the feeling France had. I was there before the war and during the war. That is the way they felt. They were wrong and those of us here who feel that way are wrong, too. Unless we are able to win this fight, as the President said the other night, on the foreign battle-



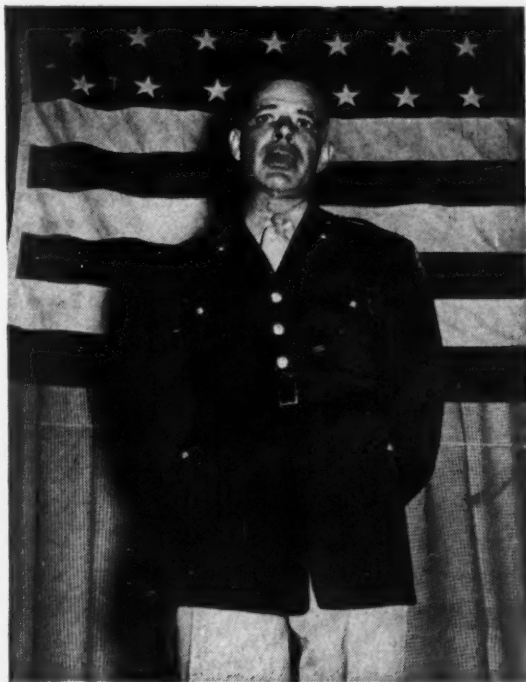
*Lieutenant Lodge congratulates Dr. Jewett*

fields on which we are fighting, that is where we are going to lose it.

"I don't doubt that if there were a Japanese Army coming across the Rocky Mountains and a German Army coming up the Florida Coast,

*October 1942*

then, as William Jennings Bryan said, 'A million farmers would spring to arms.' It would be too late then. There wouldn't be enough arms or enough trained men. We wouldn't know what we were doing. We don't



*Colonel Corput addresses the assembly*

have to wait until we see the whites of their eyes. We know whom we are fighting; we know how they hate us; we know that they will spare nothing in the way of sacrifice and pain to lick us. We know, or ought to know, that this is a war for survival. It is a war of extermination. It is bigger than a war. It is a revolution, an international explosion, and the sooner we realize that the sooner we will be able to lick them.

"Our team has been taking an awful pounding. We have been pounded in the Solomons, we have been pounded everywhere. Thousands and thousands of our men have died. Other thousands have been wounded, but at last





*Some of the Directors and General Department heads seated around a luncheon table. Clockwise from the front corner: W. F. Hosford, C. F. Craig, M. J. Kelly, A. B. Clark, M. R. Sullivan, F. W. Bierwirth and R. L. Jones*



*Lieutenant Lodge, Miss Freeman, Mr. Korn, Mr. Blackwell, Mr. Weil, Dr. Jewett, Colonel Corput and Dr. Buckley*



our team is holding. They are holding, and one reason they are holding is because of men and women like you who work hard enough and well enough to deserve an 'E' Award. Hitler made his position plain. He isn't relying on the German Army especially, or on the Luftwaffe or on the German Navy. He said himself that he is relying on the power of the German people to outwork anyone else. He thinks they can work harder than we can. I say, let us show him that men and women can work harder under the flag of freedom than the Axis lackeys under the flag of slavery.

"We have all been thrilled by the splendid fight that Russia has put up. When the Russian Army has to move back, the Russian factory worker moves back with it. He has a tag that identifies him with his machine. He sits in a box car with his machine and when they get back behind the lines he goes to work again. That is the spirit of Russia. Many of you may have wondered how the Russians can do all this. The main reason why was told on CBS at 6 o'clock Labor Day. The Russian worker goes to work at 8 o'clock in the morning and stays until 8 at night.

*Lieutenant Lodge then presented pins to Dr. Jewett, Dr. Buckley, Mr. Blackwell, Mr. Weil, Miss Freeman and Mr. Korn. In conclusion, he said:*

"Without Mr. Korn and Mr. Weil and all you other splendid workers we would be in a bad spot. We need you fellows like the devil and I think you

If any worker is 15 minutes late he is called up before a tribunal of workers and he is severely reprimanded. If he is 20 minutes late he is called before the same tribunal and sentenced to a day in jail. And if he is a day absent without proper authorization he is sentenced not by the army, not by the navy, not by the Soviet Government, but by his own fellow workers to a month in jail. That is the spirit of Soviet Russia.

"Now in this plant there must be a lot of people who have brothers and sweethearts and fathers and sons and friends on the fighting front. And I know that judging by the splendid showing that you have made you will deal with typical American thoroughness with any slacker, any waster of time, any man or woman who doesn't realize what we are up against and who doesn't fill his job as it should be filled at this time. I have called you fellow soldiers and that is exactly what you are. The 'E' emblem stands for 'example.' An example of energy and enterprise and enthusiasm, and we have all got to have the devil of a lot of enthusiasm to win this war and I know we have it. It gives me great pleasure to present these pins."

need us. And I know that with the proper teamwork, you will all take part with the Army and Navy in the final victory. Thank you!"

*Following the presentation of the flag by Colonel Corput and of the pins by Lieutenant Lodge, Dr. Buckley, in accepting, said:*

"On behalf of Bell Telephone Laboratories, Inc., it gives me great pleasure and pride to accept this Flag which the Army and Navy have bestowed upon this company and its people. Bell Laboratories is indeed

honored by this award from the armed services of the nation, and we are happy that such great opportunity is ours to be of service in the national emergency.

"We are, in fact, one of the most



*John Mills, Sergeant L. H. Campbell and Captain Bishop*

fortunate institutions to be found as regards opportunity for service. Our normal activity, as most of you know, is that of technical research and development for the Bell System. That means research to meet the electrical communication needs of the American public. Almost all of our efforts in normal times are directed towards improving the service which the Bell System provides, but even in peacetimes we have had a part in the development of communication equipment for the Army and the Navy. Consequently, with the advent of war, we were, in this war as in the last, ready to jump in and meet the call for the help which we could give. Through the work which we were already doing for the Army and Navy, we were somewhat familiar with their needs. Our way of working for the Bell System, where high-grade performance in service is demanded, is a way of working which fits perfectly the needs of the Army and the Navy. Our techniques and skills are directly applicable to the communication problems of war. So we could divert our efforts quickly from normal tele-

phone developments to developments for the armed services with little change other than a general speeding-up to throw into the program for war every bit of the effort which we could put forth. Because we fit the picture so naturally, every part of our organization readily found its place in relation to its new task.

"I should like to give you some idea of the extent of our war

activity. We have, all told, some 180 development projects for the Army and 120 for the Navy, besides some 30 contracts for research on behalf of the National Defense Research Committee which is merely another channel for working for the armed services on items in the research stage prior to the Army or Navy taking them over.

"The diversity of our war activities is most striking. While most of them relate to communication and detection by radio, by no means do all of them. We find ourselves working on projects for Ordnance, Air Corps, and Coast Artillery, as well as for the Signal Corps, and likewise we find ourselves working on projects for the different branches of the Navy. Our work deals with affairs that go on under the sea, on the sea, on land, and in the air. We are concerned with communication from very short distances to that which crosses the ocean. This diversity gives a place for all the kinds of technical knowledge, art and skill we have, and calls for uncovering new knowledge as well.

"At the same time that we are doing this great volume and diversity

of war work, we still have to carry on telephone engineering essential to maintaining the services of the Bell System in the demands placed on it in this emergency. This, too, is war work just as truly as is research and development on the tools of war, for an efficient telephone network is even more essential to a country at war than to a country at peace.

"It is not possible for everyone in this organization to see at all times how his work counts toward winning the war. This is so because many by the very nature of their work can become acquainted with only a very small part of the whole. It is more so because of the secret character of so much of the work. Even our scientists know only the particular projects on which they are engaged. Those who contribute by mechanical work may see only a single part and may wonder how it applies. Those of course who contribute through clerical work may get little more than a suggestion of the importance of the words and numbers which they handle. Only a few among us can get the picture of how the various parts of the instrumentalities fit together to make the tools which we must have to surpass those of our enemies. To one, however, who is allowed an overall picture, it is inspiring. Perhaps no one has had quite as good a chance to appraise it as myself, yet no one could be more impressed with the fact that it is not the accomplishment of a few individuals but of more

than 5,000, each of whom has his own part to contribute. So, it is fitting and proper that every member of the Bell Telephone Laboratories should share in the honor which comes to us with this Flag.

"In all this work our biggest customer is the Signal Corps, so it is particularly appropriate that an officer of that organization should represent the armed services in the presentation of this award. It is particularly pleasing to us, too, for some of us have served in the Signal Corps in the past and many of our members are now serving there. Colonel Corput is a most appropriate representative since he long had charge in the Signal Corps of activities very much like our own in the Bell System. On that account, and because of the pleasant personal associations that many of our members have had with him, we are delighted that he is here today to hand over to us this symbol of our accomplishment in the national struggle.

"Colonel Corput, the Bell Telephone Laboratories accepts from you



*H. H. Lowry, R. G. McCurdy, Elizabeth Churchill and Edward Bailey*



this Flag with joy and satisfaction, but in a spirit of humility. Joy that we have the opportunity to be of service. Satisfaction that our efforts have borne fruit and that our service is appreciated. But humility in the knowledge that the best we can do can

never be good enough. We pledge you that we shall exert ourselves still further, and that we shall never stop or relax our efforts until that day comes when our armed services shall have completely vanquished the enemy."

*Mr. Weil, introduced by Mr. Blackwell, spoke in acceptance for the craft and plant forces:*

"In accepting the Army and Navy award of merit for achievement, on behalf of the Bell Telephone Laboratories Employees Association I want to give expression to the feelings of the 1,200 Mechanical and Plant Service employees whom I represent as president.

"The Association is a labor organization operated exclusively by and for employees of the Laboratories and is affiliated with the National Federation of Telephone Workers.

"We are ever alert and striving constantly to safeguard the rights of employees and to improve their conditions, and our interests and welfare are inseparably bound to those of the other employees in the Bell System.

"Likewise we share with the other employees in the Company and in the Bell System the pride of being a part of the vast army of telephone workers

mobilized for full participation in the war effort.

"Lacking the glamour attached to other and more spectacular branches of our country's services, nevertheless we carry on unassumingly and provide means through which the armed forces and the civilian effort can function more efficiently.

"We are grateful for the recognition shown by the Army and Navy in bestowing this award upon us and feel keenly alert to the fact that coupled with this distinction is the responsibility of carrying on with redoubled effort.

"So that when the war against the foes of Freedom, Decency and Humanity has been won, we may enjoy the peace to follow, content in the conviction that we have contributed our full share toward attainment of the goal."

*Mr. Korn, introduced by Mr. Blackwell, spoke in acceptance for the other members of the Laboratories:*

"In accepting this award I have the honor to represent all the workers in the Laboratories for whom Mr. Weil has not already spoken.

"All of us are proud on this, the first occasion I believe, of an Army-Navy award to an organization which produces ideas in contra-distinction to equipment and which is not engaged in quantity manufacture.

"Yes, the business of our Laboratories is the development of ideas. The

result is a group product which depends upon the coöperation of a large number of experts, each a specialist and each contributing his particular training and skill to the evolution of the final product.

"After an idea is conceived by one of our technical staff, it is the job of the draftsman to make drawings so that it can be produced. Frequently there are mathematical studies to be made. Models must then be built.



This requires the assistance of skilled mechanics, instrument makers and wiremen. The models must be tested. Our laboratory engineers and their technical assistants conduct extensive tests representing varied conditions and extremes of use. Still other engineers prepare specifications to supplement the drawings for the use of the Western Electric Company or others who will later produce the product in quantity. In this



*Thelma Daniels (left), Virginia Erdwurm, Alice Croker and Helen McArthur*

process we call upon the services of those who purchase our supplies, our stenographers and typists. Our Laboratories plant must be maintained in its services of power and machines and must be protected by guards and ushers. Accounting, payroll, personnel and other assisting groups too numerous to mention, each in its own

way makes definite contribution to the overall development. The Laboratories is a unit in which each has his part. It is a unified, coöperative and highly coördinated organization.

"This emblem, which I join in accepting, will serve as an inspiration to loyalty and to determination to do our utmost in this emergency."

*Mr. Blackwell than stated that arrangements had been made so that every member of the Laboratories, both in New York City and in the locations in New Jersey, would receive an emblem before the end of the day.*

*Mr. Blackwell then introduced Dr. Jewett with the following words:*

"These ceremonies could not be properly completed without a few words from Dr. Jewett. While, two years ago, the growing national emergency required that Dr. Jewett turn over to other capable hands the daily leadership of the Laboratories, he is still *our* Dr. Jewett, the Chairman of the Laboratories Board, the one whose broad vision over many years was so largely responsible for making the Laboratories what they are.

"We have watched with interest the many additional obligations he

has taken. It is a constant wonderment to many of us that one man, even with so deep a sense of public service and so outstanding abilities, can accomplish so much for the public welfare. Surely a republic greatly needs such citizens.

"I present Dr. F. B. Jewett, Vice-President of the American Telephone and Telegraph Company, Chairman of the Board of the Laboratories, member of the National Defense Research Committee, Chairman of its Division of Communication and Transporta-

tion, member of the Coördination and Equipment Advisory Board of the Signal Corps and consultant to the Technical Division of the Ordnance Department of the United States

Army, President of the National Academy of Science—I have undoubtedly overlooked several others, but I will add one only—Citizen of the United States.”

*With this introduction Dr. Jewett said:*

“As Dr. Buckley has indicated, this is a noteworthy day in the history of the Bell Telephone Laboratories. It is, in fact, the most momentous day in its long history and that of its parents, the Engineering Departments of the Western Electric Company and of the old A. T. and T. Company.

“No one of the thousands of us who now make up the ranks of the Laboratories can fail to derive satisfaction and have a feeling of pride and elation on an occasion when the Nation says formally, ‘Well done, men and women of Bell Telephone Laboratories,’ and seals that verdict with the symbol it has established to signify its verdict.

“We hear a lot these days about the material tokens of success and accomplishment—of money, wages, working conditions, limited work

weeks and the like—but now, as it always has been, the greatest urge to accomplishment and the greatest sense of satisfaction in accomplishment is an intangible inner something which assures us that what we have done has met with favor with those whose opinions we value. When the group, the tribe or the Nation say, ‘Well done,’ there is given to us something which no conceivable amount of material things can equal.

“Through the ages men and women have recognized this and in various ways have sought by tokens to make permanent record of their group verdict. Always in the past and equally today, men and women have made every sacrifice—including the supreme one of life itself—to measure up to the verdict of ‘Well done.’ They have become hermits, have given up the ease of established position and material wealth, have risked life on both the battlefield and in the no less hazardous pursuits of civil life, all for the satisfaction of hearing the two words, ‘Well done,’ spoken on behalf of those whose opinion they esteem. The token which signalizes those words thereafter becomes their most treasured possession.

“As to the tokens themselves, the most treasured ones are, like the wedding ring which seals the portentous words ‘I pronounce thee man and wife,’ given in the presence of assembled friends, things of little intrinsic worth. The great medals are of bronze, the Legion of Honor, for which more men have risked life itself than



*Mr. Montamat adjusts his emblem*

any other is a bit of ribbon, and the Iron Cross of Germany, so far as value is concerned, might be rejected as poor material for tin cans. In some cases there is not even semblance of a physical token—merely a universal perpetuated recognition that the recipient of honor served his Nation and his people far beyond what is normally expected of all of us.

"While these awards of the Nation's appreciation are mainly bestowed on individuals, they are not confined to individuals. From time immemorial they have been given to groups, as witness the citation of regiments and the bestowal of a right always to fly a special flag alongside the National Standard.

"The flag we of BTL today receive is one of these and recognizes outstanding achievement of the entire group in a common undertaking for the Nation. It is particularly appropriate that it should come to us from the Army and Navy in an hour of dark peril to all we hold dear. It is likewise particularly appropriate that it should be presented for the Army and Navy by a distinguished military officer of a service which is in the best possible position to appraise the value of our work.

"Although I share equally with you the satisfaction of the award, I venture to take to myself a personal satisfaction which few, if any, of you can share. It is the satisfaction of final achievement of a dream and a philosophy now nearly forty years old.



*E. G. Andrews of the American Legion gives Lawson Cooper his emblem. All luncheon guests received their emblems as they left*

The dream was dreamed and the philosophy to make it a reality worked out thirty-eight years ago almost to this week. During the intervening years the form but not the substance of the dream has changed with changing times—the philosophy has never altered.

"This is neither the time nor the occasion to tell the whole story but the skeleton of it may be of interest to you who make up BTL today.

"About forty years ago the tiny seed of the idea of a research and development organization of the kind we now have had been planted in the Bell System. As with all new ideas, there were many skeptics and few believers. It made little headway in the sprouting operation and there was much discouragement.

"The dream of those who had faith in the applicability of the truly scientific method to the progress of the communication art was that of a great universally recognized service





*T. F. Egan (left), Gloria Beddow, Raymond Gibby and Harry Schneider*

organization. The philosophy was that if this was to come true it could be only through the coöperative effort of a team of carefully selected men and women capable of functioning as a team and not enmeshed in the turmoil of jealous civil war. Through thick and thin we have held to this philosophy, and today's event puts the capstone on it and over a far wider base than any of us ever envisioned in those now far-off days.

"Mainly the dream through the intervening years has been concerned with the peaceful affairs to which the Bell System is dedicated in the service of the Nation. Changing conditions have from time to time altered its direction but never its aim. Honors to the group have come in goodly measure. Distinctions have been bestowed on its members, and always the recipient has acknowledged his debt to the group and relegated himself to the position of a standard bearer.

and all have taken lessons from our experience.

"Whatever our own group achievements may be, we must recognize that much of what we have done to merit this present award is due in large measure to the fact that while we have been growing the Army and Navy have also grown. They have a far better understanding of their problems and a far better understanding of what we of BTL can do to aid them.

"The fruit of forty years of dreaming in the shadow of a philosophy is ripening and, what is most gratifying, it is not merely the ripening of physical achievements but likewise the ripening of trust in our ability and our integrity both within the Bell System and also in the larger world without.

"So it is that I am particularly happy to take part in this ceremonial affair in which the Nation bestows its accolade of 'Well done' on us.

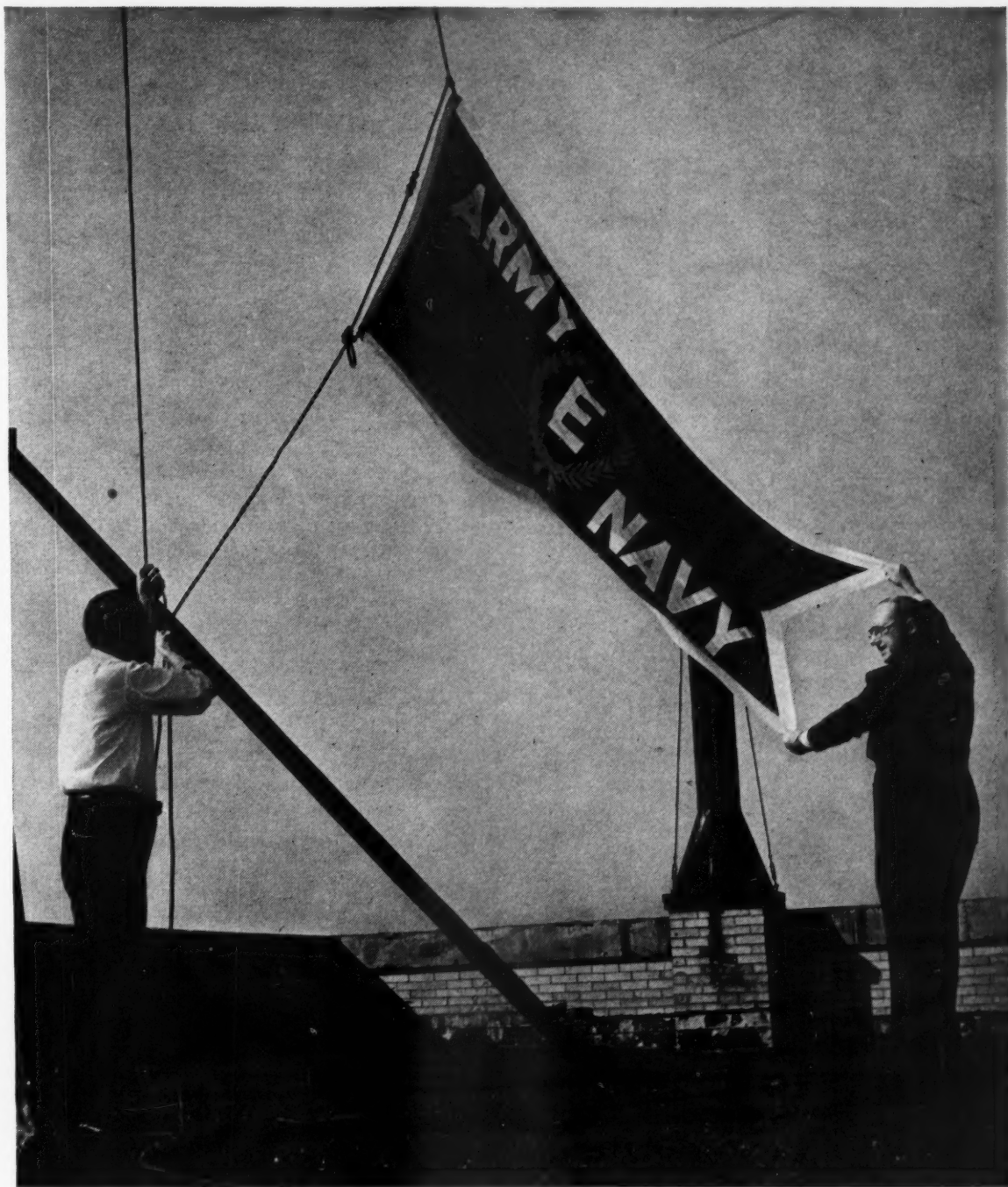
"Do you wonder?"

*The ceremonies ended with the singing of "America." All those attending the ceremonies, led by Mr. Peckham, united in singing the first and last stanzas, Miss Galli singing the second stanza as a solo.*

"In all this there have been interludes and diversions of the dream, but not of the philosophy. Dr. Buckley has mentioned World War I. In common with other parts of the Bell System we played a great part in that episode and were acclaimed for it. But then neither we nor the Army and Navy were experienced and the part we played was, necessarily, far different from that of today. Now we are all older



# NEWS AND PICTURES



*After the ceremonies on September 16, Paul Kashtelian and Edward Bulman hoist the Army-Navy "E" pennant over the West Street building*

## News of the Month

### THE ARMY-NAVY "E" AWARD

BACK OF THE impressive ceremony at which the Army-Navy Production Award was presented lies a story of arrangements carefully made in which many members of the Laboratories collaborated. For practical reasons of time and transportation the ceremony was arranged on a representative basis, as outlined in an earlier announcement by DR. O. E. BUCKLEY. There were invited *ex officio* the members of the staff reporting to Dr. Buckley and Mr. O. B. BLACKWELL and those reporting directly to them; also nine officers of the Bell Telephone Laboratories Employees Association. There were a few outside guests; and the remainder of the audience, numbering about two hundred and eighty-seven, were selected on a

proportional basis. To select 287 from 5,875 the Payroll was asked for data on the number of persons at each laboratory location, divided according to types of work, e.g., members of staff, clerical, plant and development shop, draftsmen, technical assistants and staff assistants. By a series of proportions, the number to be invited for each type of work at each location was determined. By a lottery, somewhat like that used to select "Members of the Laboratories" for biographies in the RECORD, names were then selected and invitations sent out.

In addition to the pennant presented to the Laboratories as an organization, the Army and Navy furnished lapel emblems for everyone who was a member of the Labora-



*Under the direction of Mrs. Jane Brett McIlwraith and her two assistants, Claire Holmes (left) and Florence Lutgen (right), lunch was served to the guests following the ceremonies*



*S. H. Willard and J. W. Farrell*



*E. V. Kuzela and Josephine Angelo*

tories as of August 22, the date of the letter from Under Secretary Patterson of the War Department announcing the award. The emblems are of sterling silver, enameled in red, white and blue. To make sure that each person received an emblem, the Mailing Department ran envelopes through its addressing machine, and enclosed an emblem in each. From the 5,875 envelopes, those were withdrawn which bore the names of those who would attend the ceremony, and the rest, sorted by locations, were sent out to be distributed at one o'clock on the day of the ceremony. Many hands participated in the work, which was under the general direction of Miss MARGARET McNALLY.

Music was furnished by Harry Lescourt's Orchestra, Miss Yolla Galli sang the National Anthem and "America," and the audience was led in singing by D. B. PECKHAM. Members of Western Electric Post, American Legion, volunteered as ushers; they were led by L. E. GAIGE, Commander of the post. An exceptional job was done by MRS. JANE BRETT McILWRAITH, manager of the restaurant, and her staff, augmented by extra waitresses; after the ceremony they served luncheon to guests and participants.

#### COLLEGIATE DEGREES

MEMBERS OF THE LABORATORIES on whom collegiate degrees have been conferred since the first of the year follow. These are in addition to the list published last month.

*New York University:* J. H. ANDERSON, B.S.; E. C. BORMAN, G. A. HEAD and J. A.

LEHANS, B.E.E.; D. J. BRANGACCIO, B.M.E.; and H. J. MICHAEL, M.S.

*Newark College of Engineering:* S. BALASHEK, D. S. DUGUID and G. A. SANDER, B.S. in Electrical Engineering. J. H. HEISS, JR., received a degree of B.S. in Chemical Engineering from Newark College, not B.S. and E. as listed last month.

*Columbia University:* K. M. OLSEN, M.S. in Metallurgical Engineering.

*Polytechnic Institute of Brooklyn:* E. GUZMICH, B.E.E.

#### AUXILIARY CORPS FOR AIR RAID PROTECTION

ACTING IN CONJUNCTION with the other air raid protection groups are approximately 140 members of the Laboratories who belong to the Western Electric Post of the American Legion and who have been organized into an Auxiliary Corps under the direction of L. E. GAIGE, Commander of the Post. The duties of this Corps are to assist in the prevention of panic and sabotage and to execute special assignments in connection with personnel and plant protection at West Street, the Graybar-Varick and Davis buildings, and the Murray Hill Laboratory.

The Auxiliary Corps at West Street is composed of three groups, the Morale Squad, the Guard Squad and the Communications Squad. The Morale Squad has the responsibility of assisting in the evacuation of the personnel to the shelter areas when the all-out "Alert" alarm sounds. In the shelter areas this squad is concerned with





*A group of Commanders and Captains of the Auxiliary Corps: Left to right: M. L. Clarke, R. B. Miller, G. A. Roberts, E. L. Erwin, J. M. Peabody, L. B. Eames, R. L. Lunsford, L. E. Gaige, D. H. Mann, C. W. Stevens, J. E. Ranges, F. H. Hewitt, D. D. Haggerty, L. H. Allen and F. T. Meyer*

the safety and comfort of the personnel and the prevention of panic and protection of Laboratories property. The Guard Squad is entrusted with the custody of outsiders who are in the Employment Department, Reception Room and Receiving Department at the time the alarm sounds, and those who seek shelter in our building from the surrounding streets. The Communications Squad provides means for emergency communication for the use of all emergency

groups, and is augmented by couriers stationed at strategic locations.

At the Graybar-Varick building the Auxiliary Corps assists in the evacuation of the personnel to the shelter areas and in preventing outsiders from gaining unauthorized access to floors containing Laboratories' equipment. At Murray Hill it assists the personnel to the shelter areas and supervises the outsiders who are in the Employment Department and Reception Room.

#### AUXILIARY CORPS ORGANIZATION FOR AIR RAID PROTECTION SYSTEM

*L. E. Gaige, Commander*

*L. B. Eames, Vice Commander*

*E. L. Erwin  
Morale Squad  
Commander*

*L. B. Eames  
Communications  
Squad  
Commander*

*L. P. Bartheld  
Guard Squad  
Commander*

*B. R. Blair  
Graybar-Varick  
Squad  
Commander*

*A. H. Inglis  
Murray Hill  
Squad  
Commander*

#### *Morale Squad Floor Captains for Shelter Areas at West Street*

*J. E. Ranges, Basement  
D. H. Mann, Second  
C. W. Stevens, Third*

*H. J. Delchamps, Fourth  
F. J. Given, Fifth  
F. T. Meyer, Sixth  
L. H. Allen, Seventh*

*L. T. Cox, Eighth  
G. A. Roberts, Ninth  
R. L. Lunsford, Tenth*

#### *Communications Squad Captains*

*R. B. Miller*

*F. H. Hewitt*

#### *Guard Squad Captains*

*W. A. Bollinger*

*M. L. Clarke*

*D. D. Haggerty*

*J. M. Peabody*

*S. J. Stranahan*



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# The Job Is to Win

*Excerpts from a talk given before Supervisory Employees of the  
New England Telephone and Telegraph Company at Boston*

By ARTHUR W. PAGE

*Vice President, American Telephone and Telegraph Company*

... This country has been through a lot of wars and other troubles and it comes out in the long run and for one reason, and it isn't that everybody does his part. Everybody doesn't. It's because the real people who know how and have the character and guts get the things done anyhow. There will be people who can't do anything and people with mean and petty motives, blind spots, dishonesty, selfishness, all kinds of human impediments. You'll get rulings you just couldn't believe would happen in war time. You won't have everything you need to do your job. You'll have a lot of other difficulties. You'll have forty troubles about which you could complain all day if you are a mind to. But you aren't going to do it for the reason that this is your war. I don't mean that it's your war in equal parts as it is the whole population's. I mean it's your war in the measure of your competence, and by that I mean it's a whole lot your war.

... To you who have always lived in the Bell System the idea of losing most or all of the construction program may seem cataclysmic but it isn't for we are

in a business of selling service and not materials. When a tire company gets no materials, it has no business at all. When we get no materials we still have as much business as we ever had before and the capacity to serve the vital needs of the country. What's happened to us is that we just can't grow as usual—and as a matter of fact, we wouldn't be growing this way if it weren't for the war anyhow.

What will happen to us after the war? I am sure I don't know, but I am equally certain that it is nothing to worry about now. If the Bell System is a rigid system and hasn't flexibility and imagination at the top it may not be able to meet the inevitable changes and take advantage of them. But there is no reason why we shouldn't be flexible and alert. There is sure to be change. Some people take advantage of change, others don't, but I don't know why we shouldn't make the most of it as well as the next man. People are going to keep talking and one way or another we ought to be able to make it possible and pleasant for them to do so and profitable to us.

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## TELEPHONE FACILITIES BETWEEN NEW YORK AND CHICAGO

TO HANDLE the additional volume of telephone traffic between New York and Hawthorne, the Western Electric Company has leased a second talking circuit. Both circuits are available through our P.B.X.

Before you place a call for Hawthorne, business should be in order for rapid transaction. Discussion of a large amount of detail can usually be avoided by use of TWX.

In order to divide circuit-time equitably among those who need it, no connection may remain up longer than 15 minutes. Between 3:30 P.M. and 5:30 P.M. (E.W.T.) a warning will be given after five minutes and the connection will be terminated after eight minutes.

It is suggested that calls be made before 10:00 A.M. and between noon and 2 P.M.; and that appointments be made by teletype.

It is expected that these measures will

improve the service over the leased circuits by greatly reducing the waiting time and that consequently the need for using commercial circuits will practically disappear. It is imperative that we coöperate with the Long Lines Department by placing as light a load as possible on parallel commercial circuits. These circuits must not be used except in those cases where the delay in waiting for the leased circuit would have serious consequences.

#### SYMPOSIUM ON ULTRA-SHORT ELECTROMAGNETIC WAVES

ONE OF THE GREAT AIDS to winning the war is the use of ultra-high-frequency radio equipment. Remarkable advances in this field have been made due to the extensive research and development work that has been carried on during the past few years. Because of the great significance now attached to the use of such waves, a clearer concept of their generation, transmission, and reception is desirable for electrical engineers. With this thought in mind a Symposium, *Ultra-Short Electromagnetic Waves*, will be presented by the Basic Science Group of the New York Section, A.I.E.E. This will consist of six lectures to be held at

7:00 P.M. in Room 301, Pupin Hall, Columbia University. Subjects and speakers will be:

*Electromagnetic Theory* by Professor E. Weber, Polytechnic Institute of Brooklyn, November 25.

*Transmission Line Theory* by Dr. J. R. Ragazzini, Columbia University, December 16.

*Generation* by Dr. I. E. Mouromtseff, Westinghouse Electric and Manufacturing Company, January 20.

*Guided Propagation* by Dr. S. A. Schelkunoff, Bell Telephone Laboratories, February 10.

*Radiation* by Mr. A. Alford, International Telephone and Radio Manufacturing Company, March 17.

*Reception* by Mr. Bertram Trevor, RCA Communications, Inc., April 21.

#### INSTANT WORLD-WIDE COMMUNICATIONS VITAL TO VICTORY

THIS WAR POSES communications problems such as no previous conflict knew, and the man responsible for a bomber's radio "is contributing as much to the winning of the war as the bombardier who drops the bombs," declared Major General Dawson Olmstead, Chief Signal Officer of the Army, in a recent talk.

"At one time," General Olmstead said, "military communication meant carrier pigeons and wig-wag with flags. We still have carrier pigeons. The Signal Corps breeds a lot of them. We have an old pigeon called the Kaiser. We captured him in the World War and he is quite a lively old rooster — giving us many youngsters each year.

"But the electrons have pushed the pigeons and the flags back so far that we



*E. C. Wente, President of the Bell Laboratories Club, with H. J. Delchamps (left), First Vice-President, and Mildred Ralph, Second Vice-President, discuss Club affairs with the Club's Executive Secretary and Treasurer, D. D. Haggerty (right)*

*This poster, recently displayed throughout the Laboratories' buildings, "Looks like the real McCoy" according to Mabel Scacheri in a recent New York World-Telegram. "It has the typical flat, non-fancy lighting of a news photograph made with one flash bulb on the camera.*

*To be sure, there is a certain suspicious good luck about the details. . . . But that soldier's expression is so convincing that I was ready to say it couldn't be a model in a studio. However, it was. The picture is a carefully set-up copy of a news photograph made by a Los Angeles newspaper photographer. Charles Till of the Valentino Sarra studio deliberately used the flat news-photograph lighting that fooled me, for one. The various amateur photographers who are now straining every nerve to cook up photographs on patriotic or defense themes might well study this simple shot. It is not contrived in any way. There is no hectic action, no hysteria, no montage, no inclusion of lettering. The caption writer simply said, 'We can't all go, but we can all help. Buy War Bonds,' or words to that effect. I have not seen any stronger or more telling piece of publicity in connection with war activities."*



**We can't all go . . . but we can all help!  
Put at least 10% of your pay in War Bonds.  
Sign the card today.**

don't talk much about them any more.

"This war covers practically every square mile of the earth's surface. We have troops all over the world. We are fighting a war that requires instant communications—military communications—over tremendous distances.

"There is another aspect. This war is being fought in three dimensions—on the surface of the earth, beneath the surface, and up in the air.

"It is a war with few fixed positions. Battle fronts move many miles in a few hours. It is also a war of rapidly moving mechanisms—tanks and planes and ships. There are communications problems such as no previous conflict knew.

"There are two methods of instant communication these days — wire and radio.

Wire will always carry the bulk of our communications. That must be so because there isn't room in the air for all the messages that a modern war generates. Recently I saw an advertisement stating that 12,000 telephone calls go into the building of one bomber.

"But the radio does something that wires could never do. We can't maneuver airplanes or tanks or ships by wire.

"I wish I could tell you how many radio sets the Signal Corps now has and how many more it will have in operation by the end of the year. The figures would startle you. But to mention them might enable the smart boys among our enemies to work out some things that we don't want them to know.

"An airplane without a radio has been called a dead pigeon. A tank with defective



communications is like a blind horse. The man responsible for the condition of the radio, which makes it possible for a bomber to reach Berlin and knock the daylights out of the Nazi capital, is contributing as much to the winning of the war as the bombardier who drops the bombs."

### TELEPHONE PIONEERS

MEMBERS OF THE LABORATORIES enrolled as members of the Edward J. Hall Chapter of the Telephone Pioneers of America during the second quarter of 1942 were:

E. L. Baulch	W. A. Marrison
Ferdinand Entz	M. O. Schrum
Otto Michal	Thomas Spencer
G. S. Mueller	Lester Germer
A. A. Hansen	John Zoller
J. C. Rile	

### LABORATORIES GIRL WINS N.Y.U. SCHOLARSHIP

FOR SEVERAL YEARS New York University has offered six-year scholarships in the University's evening school on a competitive basis to young people who are members of business organizations in the metropolitan district. Arrangements are made by our Personnel Department which undertakes to notify those who would be eligible. This year MISS GLORIA SHANNON, a technical assistant in the mathematical research group of the Circuit Research Department, had the honor of winning a scholarship.

Graduating from Curtis High School, Staten Island, this year, Miss Shannon entered the Laboratories in January, and in May took up her present work. She always liked mathematics, and now that she is working side by side with college graduates, she sees the need of additional training to realize her ambition.

Gloria likes active sports, such as skating and bicycling; she mentions the latter somewhat ruefully, since a first-class spill brought her recent brief vacation to an untimely end.



MISS GLORIA SHANNON

### QUALITY CONTROL

ADDITIONAL INFORMATION on quality control in ordnance inspection, discussed by G. D. EDWARDS in the last issue of the RECORD, was presented from the standpoint of the United States Ordnance Department by Col. Leslie Simon in the September issue of *Electrical Engineering*. Col. Simon, who is Director of the Ballistic Research Laboratory, Aberdeen Proving Ground, says in part: "The use of quality control in the Ordnance Department began at Picatinny Arsenal about seven years ago. This application was motivated from the top down, which I believe is the manner in which most applications must be motivated. Only the management has the breadth of vision to foresee results and the authority necessary to institute change.

"The influence for change arose from conversation between the officers in command and Doctor Frank B. Jewett, then president of the Bell Telephone Laboratories. This first application was characterized by a total absence of statistically trained personnel. However, after a careful study of Doctor Walter A. Shewhart's book, a study of the production lines from the viewpoint of quality control (including many trial runs), and after a great deal of advice most generously given by Doctor Shewhart himself, a quality-control system was devised for the production of munitions which operated successfully without material change for about six years. During the last year, under the able direction of Captain A. C. Cohen, I understand that considerable improvement in the system has been made.

"The most recent development in the Ordnance Department is attributable to Doctor Shewhart, Captain Cohen, and several others who talked together at the last meeting of the Institute of Mathematical Statistics. They realized that they, the Laboratory, and the Proving Ground were being burdened with a large number of questions from various persons and establishments regard-



ing the use of quality-control techniques in war industry. As a result of their initiative, a letter was written by the Commanding General of Picatinny Arsenal which resulted in a conference at the Ballistic Research Laboratory which, in turn, resulted in calling this condition to the attention of the Chief of Ordnance. There has now been established in the office of the Chief of Ordnance an organization, under the direction of G. D. Edwards, Director of Quality Assurance in Bell Telephone Laboratories, for coördinating the efforts of various departments and establishments with respect to quality-control techniques. All divisions of the Ordnance Office and all establishments employing quality control have representatives for contact with this organization. In this way, an exchange of ideas is effected, assistance in difficult phases of problems is obtained, and inquiries from various sources are passed along to the central body for authoritative answers."

British appreciation of Dr. Shewhart's work on quality control is expressed in a recent issue of *Beama Journal*, the official organ of the British Electrical and Allied Manufacturers' Association. In an article by H. Rissek presenting a review of progress in the statistical method of quality control, Mr. Rissek said: "The actual development of quality control technique is due to Dr. W. A. Shewhart of Bell Telephone Laboratories. . . . Thanks mainly to the pioneer work of Dr. Shewhart, quality control has in the past ten or fifteen years become an integral feature of large-scale manufacture in many branches of engineering industry in the United States."

The aluminum in two coffee pots would provide enough of this material for two large incendiary bombs.



*Captain Howard J. Keefer is now Signal Officer for the Hawaiian Anti-Aircraft Artillery Command*

## NEWS OF MEN IN SERVICE

### Captain Howard J. Keefer

"SEEMS AS THOUGH I could have written to you long before this, but time passes so quickly that months seem like days, and before one realizes, a year has passed. I have been on active service since the beginning of April, 1941, stationed at Fort Hamilton, Brooklyn, for four months, and now stationed in the Hawaiian Islands for a year.

"Originally I was a Seacoast Artillery Officer, but since coming out here have been attached to the Signal Corps and now I am serving as the Signal Officer for the Hawaiian Anti-Aircraft Artillery Command. Even though most of our work is in the field I am constantly in touch with telephone equipment which makes me feel right at home. The accompanying photograph was taken on a recent field inspection trip.

"This past May I was promoted to the grade of Captain and since that time I have been working much harder, really earning my increase in pay.

"A few things that bothered most of us after the war started was the continuous blackout, eight months of it to date, and then for awhile strict prohibition. But since Pearl Harbor, most of the places and indoor recreation halls have been properly blacked-out and we have our weekly ration of beer, so everyone is happy. Our morale is very high and we all hope that one of these days we will



*Robert J. Koechlin, formerly of the Club Store, who was recently commissioned Second Lieutenant in the Infantry, writes his autograph for Elizabeth Beall, on his right, and Helen Cory, on his left. Lieutenant Koechlin was married on August 1 and his wife is shown on the extreme left*

be able to get another crack at those Japs, if not here—further on.

"I have been corresponding with quite a number of Bell Lab members and thus keep in close touch with the goings-on back there. Nevertheless, one thing that I look forward to every month is the BELL LABORATORIES RECORD. To date I have not missed a copy—so please keep them coming. I circulate the RECORD around to quite a few former Bell System Employees, they all enjoy it as much as I do."

#### **Lieutenant Walter W. Maas**

"IT IS DIFFICULT for me to keep you informed as to my whereabouts inasmuch as I have been leading a gypsy-like existence. Since I last wrote I have been in California with the Air Force on coast patrol and then was sent to Fort Monmouth, N. J., where I attended the Signal Officers' Candidate School.

"Since graduation I have been on duty with the Signal Corps at Drew Field, Florida. My job consists of operating and maintaining a portable information center. This equipment, I am happy to say, has all been developed by the Laboratories. Four of my men are also Bell System boys, so we feel pretty much at home.

"For the past two weeks I attended

Fighter Command School at Orlando where two of my instructors were former New York Telephone Company men. While there I also came in contact with a number of engineers from the Laboratories who were working on field testing some new equipment. Military secrecy forbids my saying much about the work I'm doing but I find it extremely interesting even, though it is complex.

"I enjoy greatly receiving my copy of the RECORD and trust that it will continue its interesting news of the doings of so many of my old friends. I'd also like to urge the folks back on the job to drop a line now and again to those of us in the service for we surely, to say the least, appreciate the letters."

#### **Major Morton Sultz**

FROM WASHINGTON, where he is attached to the Office of the Chief Signal Officer, Major Sultz writes:

"The August edition of BELL LABORATORIES RECORD arrived yesterday and it is probably the first time I have felt homesick. . . . I do want you to know that although I am only a short way from New York our contacts rapidly grow less and receipt of the RECORD, I am sure, will be a great help as time goes on. . . . I was interested to see that John Mills' Committee on War Bonds—of which I feel that I am a member in absentia—has pushed the payroll deduction to 7.6 per cent of the June payroll. That looks like good work. Congratulate him for me."

#### **Lieutenant Laurence G. FitzSimmons, Jr.**

LIEUTENANT FITZSIMMONS is in command of a sub chaser and during the past few months has been on coastwise convoy duty. On August 16, from California, he wrote:

"I've seen and talked with many men and officers about the . . . equipment that the Western Electric is turning out. They claim that it's one of the most useful pieces of equipment on board their ships. Believe me,

but I'm proud to think that the W. E. Co. and the Laboratories are behind the service men 100 per cent. Our equipment is right out there in the front lines helping to win the war. I know because I've seen it there.

"The copies of the RECORD that are forwarded to me each month are most welcome. It keeps me right up to date with what is happening back at the Labs. I find that I look forward to the RECORD much more now than when I was back at the Labs. Before it was 'Did I get my name in?', while now it's 'What is happening back there in the B.T.L.?' I can assure you that each and every printed word is now read and then generally read again."

#### Aviation Cadet Thomas Pariseau

"THE LAST TIME I wrote I was riding horses with the cavalry but now as you can see from the accompanying photograph, I'm flying for the Army Air Corps. At present I am struggling through a preliminary training school at Fort Worth with the hope of some day becoming a pilot.

"We are constantly on the go. Mornings we spend on the flight line either flying or discussing flying with our instructors. Afternoons are spent in ground school, learning



*Aviation Cadet Thomas Pariseau is now in the Army Air Corps at Fort Worth*

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how and why the plane flies. The entire course is very interesting and I am enjoying it very much."

#### Lieutenant Robert Winans

"I'VE BEEN OUT ON the West Coast now for a little over two weeks and beginning to get into the swing of things.

"Fort Ord is rather a large post with the



*James J. Viggers, on furlough from Camp Kilmer in New Jersey where he is now a Private First Class, relaxes with "Sandy" at the home of his fiancée, Miss Evelyn Hahn in the Bronx. Miss Hahn works for the New York Telephone Company*

personnel changing as units come and go. The Signal Battalion to which I am assigned is a regular unit for supplying communication for the Army Corps. I have been assigned to the Headquarters Company and I am working in the radio section. Right now that means training of personnel in code and set operation.

"Most of my time so far has been spent in getting acquainted with what we have and with what goes on. That will be short-lived as we leave shortly for desert maneuvers.

"Before I came to this side of the country, I always thought that California was a land





*Irving C. Osten-Sacken was commissioned a Captain in the Air Service on September 1 and is now at Bolling Field in Washington*

of sunshine and warmth but I found out differently. Right at this spot it is cloudy most of the time and cold. They have heating units in all of the barracks and they operate most of the time. I came out here in cottons and then found that the official uniform for Fort Ord is woolen O.D. the year around. What a place! Of course, if you go inland about ten miles, then it does get sunny and warm, but we won't see that kind of weather until we leave for the maneuvers, then we will probably be cussing it."

#### **Ensign Charles C. Rock**

"ON AUGUST 14 I completed a training course at the Naval Training School (Indoctrination) at Fort Schuyler in the Bronx and was ordered to report to Quonset Point, Long Island, for duty as engineering officer on a Navy project.

"There is always plenty of work to be done and most of it is very interesting, as is also the station itself with its many activities. A touch of the Labs is provided by frequent contacts with engineers I knew when I was at West Street."

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CHARLES T. BOLGER is now with the Signal Air Raid Warning Service at Drew Field, Tampa.

OWEN GIERTSEN was appointed an aviation cadet on August 14 and is now undergoing training at the Santa Ana (Calif.) Army Air Base.

MAJOR ANDREW W. CLEMENT of the Coast Artillery Board, Fort Monroe, Virginia, was commissioned Lieutenant Colonel on August 21.

ROBERT F. McLAUGHLIN is now a corporal in the Signal Corps at Columbia, S. C.

MEMBERS OF THE LABORATORIES who have been granted leaves of absence to enter military service since those noted in the last issue of the RECORD are: CAPT. FOSTER B. BLAKE, HORACE J. CAMP, DAVID N. FULTON, RICHARD D. LONG, CAPT. IRVING C. OSTEN-SACKEN and WILLIAM T. QUINN; naval service, ROBERT ANGLE, NICHOLAS BRADY, JEREMIAH J. DOODY, ENSIGN JOSEPH A. LEHANS and EMMETT F. NOE; and the U. S. Marines, ARNE J. ELVEJORD.

PERSONAL LEAVES OF ABSENCE have been granted to HERMAN A. LARLEE to accept a position in civilian capacity with the Signal Corps; to CHARLES R. LEUTZ, JR., for Civilian Pilot Training in preparation for the Navy Air Force; to GUSTAV A. BACKMAN to enter the Signal Corps Training School; and to JOSEPH W. HOEK to accept a position with the National Defense Research Committee.

#### **NEWS NOTES**

O. E. BUCKLEY has been appointed a member of the Fortescue Fellowship Committee for the term of three years beginning August 1, 1942, and as chairman for the administrative year 1942-1943. C. W. GREEN is secretary of this committee.

DR. BUCKLEY and R. R. WILLIAMS at the annual meeting of the American Philosophical Society were elected to membership.

THE BOARD OF TRUSTEES of Princeton University has elected W. A. SHEWHART to

A pint of alcohol goes into the making of  $\frac{1}{2}$  pound of smokeless powder.

October 1942



membership on the Advisory Council of the Department of Mathematics and P. B. FINDLEY to membership on the Advisory Council of the Department of Electrical Engineering. Both Mr. Shewhart and Mr. Findley will serve three-year terms.

THE WAR POLICY COMMITTEE for Physics, of which DR. BUCKLEY is a member, has issued its first two reports. The first report covers the Professional Status of Physicists, Training in Physics for the War, Emphasis Upon the Study of Physics, Special Training of Physicists, and the Use of Physicists. The second report discusses the alarmingly serious situation of national manpower in physics which the committee believes has reached the proportions of a national emergency and makes recommendations as to how it should be met.

W. O. BAKER and C. S. FULLER visited the Röhm & Haas plant at Bristol, Pennsylvania, to discuss plastic matters.

C. J. FROSCH visited at Hawthorne in regard to plastic problems.

H. W. HERMANCIE visited Buffalo and Pittsburgh central offices in connection with contact treatment trials.

R. R. WILLIAMS, A. R. KEMP and C. S. FULLER visited the Dow Chemical Company, Midland, Michigan, to discuss plastic problems. On August 19, Mr. Kemp visited the Northern Regional Laboratories of Bureau of Agriculture to discuss rubber substitutes. On the same trip he visited the Research Laboratories of Goodyear Tire and Rubber Company, Akron, to discuss problems concerning the development of synthetic and vinylite tape.

A. R. KEMP, J. H. INGMANSON and W. G. STRAITIFF were at Point Breeze in connection with the development of rubber-covered wire.

R. M. BURNS presided at the A.A.A.S.-Gibson Island

Corrosion Conference at Gibson Island, Maryland. He also visited, with K. G. COMPTON, the Point Breeze Plant with reference to finish problems. Mr. Compton and W. E. CAMPBELL also attended the Gibson Island Conference.

H. T. LANGABEER discussed power plant questions at the Electric Products Company, Cleveland, and at the Illinois Bell Telephone Company.

C. H. ACHENBACH was at the General Electric Company in Schenectady and in Fort Wayne in connection with motor-generator problems.

V. T. CALLAHAN was at the Duplex Truck Company, Lansing, and the Century Electric Company, St. Louis, to discuss power-plant engine developments.



# OFFICE OF CIVILIAN DEFENSE

Washington, D. C.

May 15, 1942

CIVIL AIR PATROL  
NEW JERSEY WING  
FIELD HEADQUARTERS  
SOMERSET HILLS, NEW JERSEY  
BASKING RIDGE, N. J.

## TO WHOM IT MAY CONCERN:

This is a letter of recommendation for Mr. Irving Charles Osten-Sacken whom I have known for approximately six years.

I have been quite closely associated with him since September 1941 in connection with the organization and operations of the New Jersey Wing of the Civil Air Defense Services and the Civil Air Patrol, of which I am Commander.

First of all, Mr. Osten-Sacken is of unquestionable character, highly regarded and respected by his friends and business associates. He has a remarkable sense of humor and the ability to use it to best advantage.

His leadership and organizational ability have been of tremendous help in bringing the New Jersey Wing to its present state of development.

In the initial organization he was named as a Flight Leader. Successively he was appointed Squadron Commander, Group Executive Officer, and is now Commander of Group 1, one of four persons in the Wing second in rank only to the Wing Commander. His services have been so consistently enthusiastic and efficient that I have suggested to the Regional Commander that he be appointed Wing Commander should unforeseen circumstances suddenly necessitate my replacement.

He was the first Civil Air Patrol member to report for duty as a pilot on the Coastal Patrol, the accomplishments of which are now common knowledge. His services in this connection were outstanding.

Throughout, his work, and the spirit with which he carried it out have been not only entirely satisfactory, but truly inspiring.

*George A. Viehmann*

George A. Viehmann  
Commander New Jersey Wing  
Civil Air Patrol

*Now Captain Osten-Sacken is continuing his excellent work in the Army Air Corps*

October 1942

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## Some Members of the Laboratories

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THIS MONTH the RECORD presents the following biographies of members of the Laboratories chosen by lot.

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THERE ARE TWO CAREERS in the RINDLAUB household—WILLARD W. is an engineer in our Equipment Development group and his wife is a copy writer in that advertising agency known to the profession as "B.B.D. & O." They have found that to be no bar



WILLARD W. RINDLAUB

against children; they have two, a boy of eight and a girl of four years. Key to the situation is an aunt, who lives with them.

"Rindy," as he is known to that sociable group of engineers in G.V.-1422, was born in Carlisle and educated there and in Downingtown, Pennsylvania. He went to Lehigh for one year and then to the University of

Pennsylvania, where he was graduated in 1927 (B.S. in E.E.). After two years in the Philadelphia Electric Company he entered the Laboratories, becoming a member of the Trial Installation group. One of the big jobs in which he had a part was the installation of an automatic routine sender test frame at 32 Sixth Avenue. He then transferred to the Manual Equipment group, working on manual switchboards and associated equipment. Later, with General Equipment Standards, a group which concerns itself with such problems as fuse panels, cable racks, central-office lighting, new wiring and cabling methods, and the application of new finishes to equipment, he was active in the main on central-office lighting and particularly with the employment of fluorescent lighting for this purpose. Specifications prepared by this group are used by engineers in design work and by Western Electric in manufacture and installation. Now, and for the duration, Mr. Rindlaub is engaged on projects connected with the war.

In his home town of West Englewood, Mr. Rindlaub is a vestryman and sings in the choir of his church. He recalls that once upon a time he used to take automobile trips to the Smokies and the Gaspé during vacation.

\* \* \* \* \*

WHEN HALVARD LOFSGAARD finishes checking a drawing on some government job, he looks up at his Savings Bond emblem and smiles grimly. For his work and his savings are helping to win the war and bring him news of his mother, in Norway, from whom he has not heard for eighteen months.

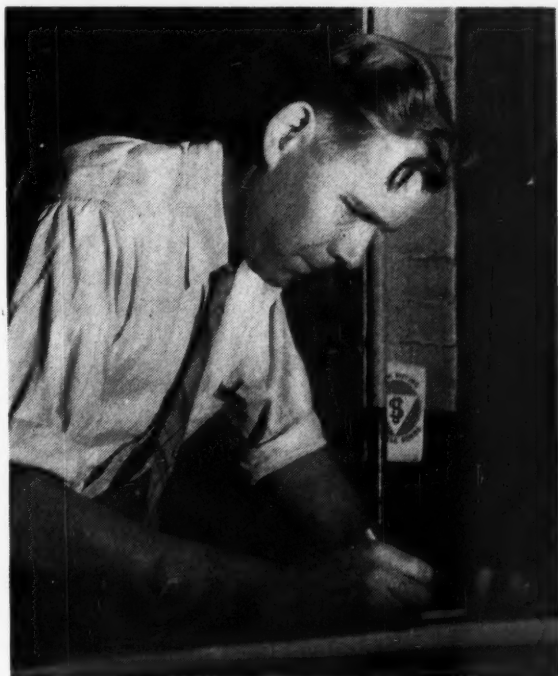
Born on a farm near Oslo, Lofsgaard worked there until he went away to a high school. He graduated from a technical school in 1920 and came to the United States where he worked at Hawthorne for three years as a draftsman on racks and cabling, then went to International Harvester for a time, and entered the Laboratories in 1929 as a member of Research Drafting. He has had a hand in the design of most of the transoceanic transmitters and receivers developed in Radio Research.

On his way back from a visit to Norway, Lofsgaard met the girl he afterward married. Now they have two daughters, aged seven and eleven. He designed their home near Pompton Lakes, and was his own general contractor for it. A swim every evening in summer, and convenient skating and skiing in the winter, make the long trip worth while. An ardent table tennis player, he was at one time head of our Table Tennis Club.

\* \* \* \* \*

MANY OF THE MEN who have entered the Laboratories in the past two years know BILL FRENCH, for it was he who discovered that they belonged here and arranged for their induction on the job.

Born across the river in West New York, he was graduated from high school there in 1937 and the same year entered the Laboratories by way of the messenger group. He was very soon chosen for assignment to the Personnel Department, where he shortly



HALVARD LOFSGAARD

began to handle the many clerical duties incident to placing new employees on the payroll and then became a full-fledged interviewer and staff assistant, which is his present job.

Speaking of his duties, Bill says: "When the Laboratories has vacancies to be filled,

and we know of no acceptable candidates, we may advertise or contact an agency, particularly the United States Employment Service. As the men come in, they are asked to fill out our qualification record. With this before me as I talk with them, I am able to round out important details and decide whether the applicant possesses the neces-



WILLIAM L. FRENCH

sary qualifications to fill the opening and the personality to fit happily into our Laboratories family. If the prospective supervisor also is satisfied, the man is employed subject to an examination by our Medical Department to insure that his health and physique are adequate for the work he will perform. At present, my work is with applicants for non-technical jobs, such as messengers, clerks, draftsmen, building service and shop mechanics. The war has made inroads on our staff, as readers of the RECORD well know, and at the same time has drained the labor market, thus making extra heavy the load that we must carry."

Bill's job makes necessary a wide acquaintance with supervisors throughout the



Laboratories and a detailed knowledge of all the openings that he is called upon to fill. Just to make sure that he has no idle time, he has been studying mechanical engineering in the evenings at New York University and has completed five of a six-year course.

The war will not leave Bill with us much longer. He is an ensign in the Naval Reserve—his hobby is sailing at every opportunity—and expects to be called into active service upon graduation next June. Meanwhile, he lives in Weehawken with his mother and brother; another brother is already in the Navy.

\* \* \* \* \*

J. E. RANGES spent two weeks at Hawthorne developing new designs of toll loading coil cases to effect economies in steel.

P. S. DARNELL was at Hawthorne from August 26 to August 30 on the manufacture of networks and resistances.

MEMBERS OF THE LABORATORIES who completed twenty years of service in the Bell System during September were:

#### *Research Department*

P. H. Betts	H. C. Lloyd
J. E. Crowley	Jacob Mayer
E. D. Deery	Henry Peters
F. A. Hubbard	E. J. Ryder

#### *Apparatus Development Department*

J. H. Bullwinkel	V. E. Legg
E. C. Erickson	L. W. Morgan
J. A. St. Clair	

#### *Plant Department*

J. B. Connolly	Robert Halliday
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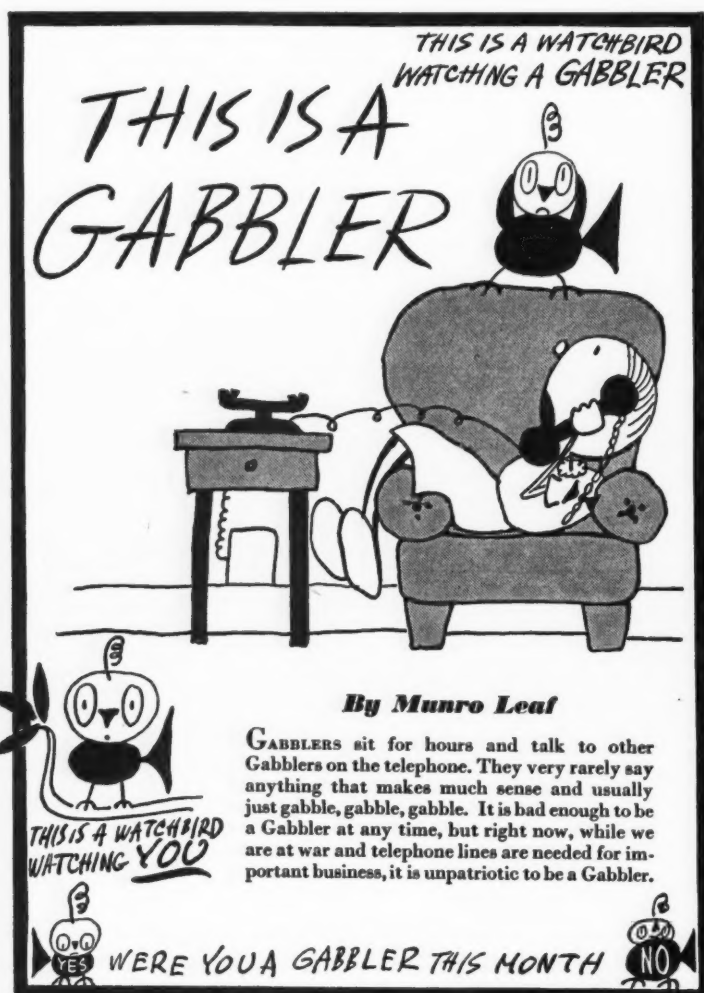
FREDERICK W. MORRIS has left the Apparatus Specifications Department to become a priest in the Episcopal Church. He was ordained in the Trinity Church at Roslyn on Sept. 6. Rev. Mr. Morris had been a curate in the church for the past year.

A. M. SKELLETT will speak on *The Use of Secondary Electron Emission to Obtain Trigger or Relay Action* before the first meeting of the Basic Science Group of the New York Section, A.I.E.E. The meeting will be held in the Engineering Societies Building, 33 West 39th Street, New York City, on October 13 at 7:30 P.M. Dr. Skellett will discuss the use of secondary electrons to obtain trigger action similar to that of a thyratron and describe an experimental tube and the necessary circuits by which this action is achieved. This combination gives the features of a triode with a relay, or "on and off," feature which is a thousand times faster than a gas tube and which, unlike the latter, may be turned off by grid control.

D. D. MILLER visited the Leeds and Northrup Company, Philadelphia, in connection with special apparatus.

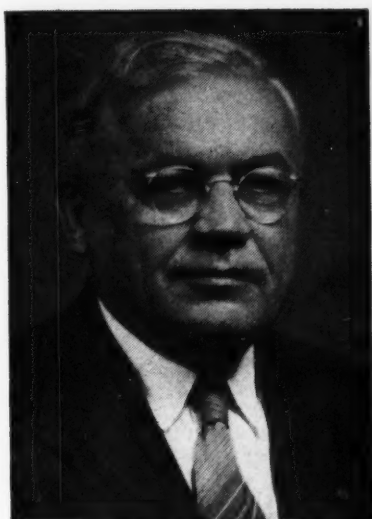
W. H. HARVEY made a trip to Struthers Dunn, Philadelphia, concerning special apparatus.

F. A. KORN and F. F. SHIPLEY, with engineers of the A T & T,

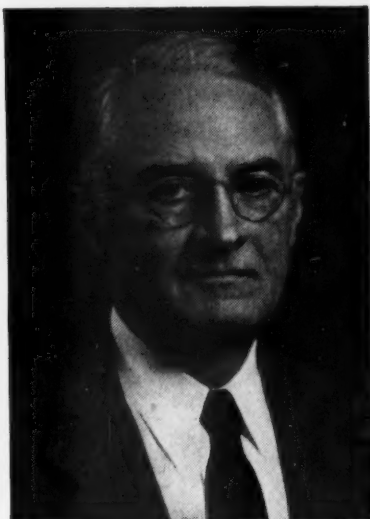


Courtesy of Ladies' Home Journal

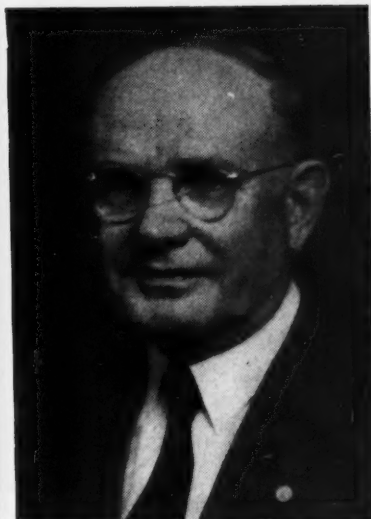




CHARLES D. DUSHECK  
of the Equipment Development Department completed forty years of service in the Bell System on September 3



FRANCIS A. COX  
of the Switching Development Department completed forty-five years of service in the Bell System on September 15



EDGAR M. MATTHEWS  
of the Outside Plant Development Department completed forty years of service in the Bell System on September 2

were in Philadelphia discussing crossbar toll-office problems.

A. S. WINDELER of Point Breeze visited Murray Hill for a discussion of special coaxial cable problems.

M. V. HUNTER visited the General Electric Company, Schenectady, on voltage regulators.

U. S. FORD has been at the Trenton central office supervising the installation of test equipment for use in dial central offices.

A. F. BURNS' article, *A Circuit Continuity Test for the Crossbar System*, published in the May, 1942, issue of the RECORD, was abstracted in a recent issue of *Nature*.

A. R. D'HEEDENE visited the Point Breeze plant of the Western Electric Company to discuss problems in the manufacture of special crystal filters.

W. J. KING went to the Hawthorne plant on matters pertaining to cable.

R. T. STAPLES discussed special cords at the Point Breeze plant of the Western Electric Company. H. H. STAEBNER also visited Point Breeze for a discussion of matters pertaining to cable.

A. R. SWOBODA, after a year's assignment to special work with the Western Electric Company at Kearny, has returned to the Laboratories.

D. R. BROBST visited Fort Monmouth in connection with Government work.



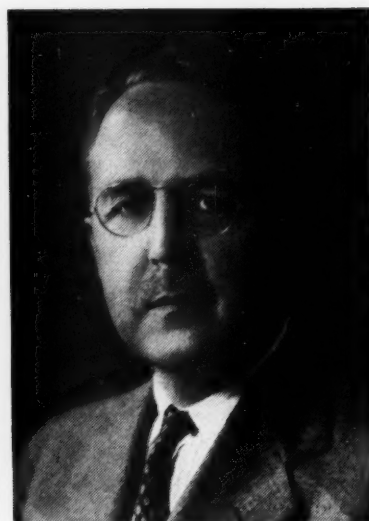
*On Christmas morning, maybe your gift package will not have reached your Service Man; and maybe his buddy had no one to send him anything. To be sure every soldier and sailor overseas receives something from home, your Red Cross chapter asks you to fill bags like this, which it will supply, and return them to its headquarters for distribution. This assortment cost about \$1.25*



WARREN C. JONES  
*of the Switching Apparatus  
Development Department  
completed thirty years of Bell  
System Service on Sept. 1*



GEORGE A. KELSALL  
*of the Physical Research De-  
partment completed thirty  
years of service in the Bell  
System on September 30*



HALSEY A. FREDERICK  
*of the Switching Apparatus  
Development Department  
completed thirty years of Bell  
System service on Sept. 23*

#### TWENTY-FIVE-YEAR SERVICE ANNIVERSARIES

MANY AND VARIED are the contributions that HARRY NYQUIST has made to the communication art during his twenty-five years of service in the Bell System. They range from the purely theoretical analyzation of fundamentals to the practical application of these fundamentals to the development of apparatus and circuits and cover practically every phase of the telephone business as attested by a review of the 131 patents that have been issued to him. An able mathematician, Dr. Nyquist possesses the capability of interpreting in physical terms to his engineering associates the results of mathematical work of himself and other mathematicians. He is also particularly capable in formulating problems in telephone and telegraph transmission so as to subject them to mathematical analysis. He has published many papers, classic of which are *Certain Topics in Telegraph Transmission Theory*, *Thermal Agitation of Electric Charge in Conductors*, and *Regeneration Theory*.

From 1917 to 1921 Dr. Nyquist was chiefly engaged in d-c telegraph problems including the development of the metallic telegraph system and methods for measuring telegraph distortion. Subsequent to this he broadened his work to cover the development of voice-

frequency systems and various aspects of telegraph theory. From 1921 to 1935 his field of activity included development of ways and means for extending and improving long-distance telephone circuits, particularly cable circuits and connections between wire and radio links. He also devoted considerable time to the development of picture transmission systems and to problems connected with television.

Since 1935 Dr. Nyquist's work has been largely of a theoretical and consulting nature, concerned principally with problems of the same general nature as previously covered and with other branches of the communication art. During the past year a large portion of his time has been on war projects.

Born in Nilsby, Sweden, Dr. Nyquist came to this country in 1907. He received B.A., B.S. and M.S. degrees from the University of North Dakota; and the Ph.D. degree from Yale in 1917. He immediately joined the Engineering Department of the A T & T, transferred to the D & R when this was formed in 1919, came to the Laboratories at the time of the 1934 consolidation and is now Consulting Engineer and is in charge of the transmission theory group.

The Nyquists, residents of Millburn, have three daughters and a son. The oldest daughter graduated from the University of

Rochester this spring and now works for Curtis Wright in Buffalo. Their son finished his first year at Cornell in June and is continuing there in the accelerated course. The other two daughters are in high school. Dr. Nyquist is interested in gardening. He is a Telephone Pioneer.

\* \* \* \* \*

SOON AFTER T. C. CAMPBELL joined the Engineering Department of the Western Electric Company he transferred to submarine detection problems, working on the design, building and installation of equipment of a station at the entrance to Chesapeake Bay. Following the war he engaged in the development of the panel system, principally on mechanical apparatus such as clutches and drives. In 1923 he transferred to the Equipment Development Department. Some of the projects with which Mr. Campbell has been associated include the development of the 400-point line finder frame, of rolling ladders for central offices and of the new line-message register cabinet. For the past few months he has been working on war projects.

Before Mr. Campbell joined the Bell System he spent a year with the Hobart Electric Company and then studied at Ohio State University from 1907 to 1911 during which time he was in charge of the installation of electrical equipment in the laboratory buildings. The next year he was with the Electrical Department of the Florida East Coast Railway Company and then spent five years

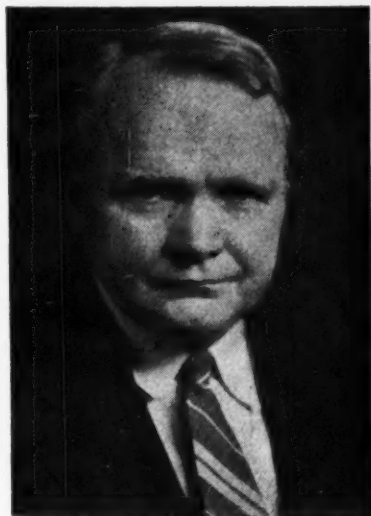
selling automobiles and motorcycles throughout the State of Florida.

Mr. and Mrs. Campbell live in Rutherford. He is a member of the Telephone Pioneers of America.

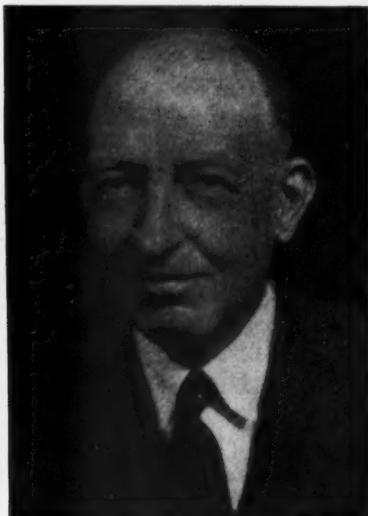
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SOON AFTER G. T. ROGGEMAN joined the Western Electric Company he became a clerk with the group in the Systems Development Department handling apparatus problems with the Hawthorne plant. He left for military service in November, 1918, but when the Armistice was signed immediately returned. From then until 1930 Mr. Roggeman was in the Apparatus Drafting Department concerned with the design of apparatus for telephone systems, picture transmission and sound pictures. During his early years at West Street he took evening courses for five years in drafting and mathematics at Mechanics Institute, Brooklyn Poly and Columbia.

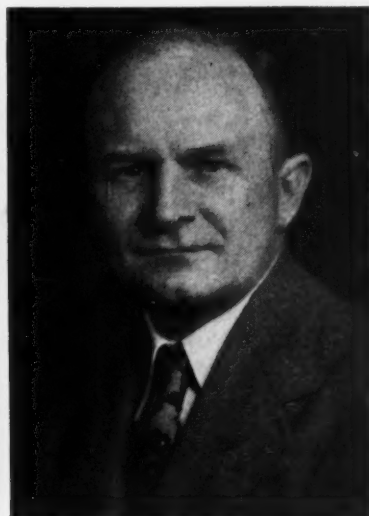
In 1930, when the Commercial Products Development Department moved to the Graybar-Varick building, Mr. Roggeman also went there with the group from the drafting department and collaborated in the design of aircraft and police radio transmitters and receivers, broadcast transmitters, speech input equipment, and equipment for the Army and Navy. In 1937 he transferred to Commercial Products Specifications Department and since then has prepared specifications which, for the past year, have consisted primarily of radio com-



*Harry Nyquist*



*Thaddeus C. Campbell*



*George T. Roggeman*



munication equipment for the armed forces.

The Roggemans, residents of Valley Stream, have one daughter who entered high school this year. Their vacations are usually spent in the northeastern section of Pennsylvania. He is a Telephone Pioneer.

\* \* \* \* \*

AFTER L. C. ROBERTS received the A.B. degree from Harvard in 1916 he spent the following year at M.I.T., receiving the B.S. in E.E. degree in 1917. He then joined the Department of Development and Research of the A T & T and came to the Laboratories in 1934. His work has been mainly on the transmission development of telephone and telegraph repeaters. He has long been associated with d-c telegraph work, with its related problems of prevention of interference with the operation of telephone circuits on the same wires and the prevention of interferences from signaling and power currents to telegraph; with a-c operated telephone repeaters for railways; and with voice-frequency telegraph, particularly on problems connected with its application to types J and K telephone systems. Mr. Roberts also spent some time on development work related to wire connections to radio, and in 1931 spent three months in Honolulu in connection with the radio link with the United States. More recently he has

been working on the development of telegraph transmission systems to be used by the Signal Corps. Over fifteen patents attest his contributions to telephony and telegraphy.

Mr. and Mrs. Roberts live in Towaco. Their daughter graduated from Wooster (Ohio) College last June and their son, who is now a candidate for ensign in the U. S. Naval Reserve, from Drew University this past summer, Mr. Roberts, a Telephone Pioneer, has been chairman of the Montville (N. J.) Water Commission since 1939. His favorite outdoor sport, sailing, he enjoys around Cape Cod, where a majority of his vacations are spent.

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C. R. STEINER graduated from Syracuse University in 1915 with an E.E. degree and spent two years with the Crocker-Wheeler Company at Ampere, N. J. He then joined the apparatus design group at West Street where he was concerned with design and development of relays. During the war period he was on the development of radio power equipment for submarine chasers and aircraft. After the Armistice Mr. Steiner was loaned for two years to the commercial group engaged in the settlement of war contracts. He then returned to the relay group where he aided in a comprehensive analysis of relay design requirements. He was associated

with the design of the 218-type relay and with the introduction of the initial manufacturing information at Hawthorne covering step-by-step relays. For several years he supervised the design of resistances and step-by-step relays.

Since 1931 Mr. Steiner has been in the Repaired Apparatus Department, first on the preparation of Bell System Practices and KS repair specifications for the repair of telephone apparatus and more recently on development work in connection with thermistors and electrolytic condensers.

Mr. Steiner is a fresh water fishing enthusiast, is fond of good music and is a member



JUSTUS H. BOWER  
*of the Transmission Apparatus Development Department completed thirty years of Bell System service on Sept. 10*

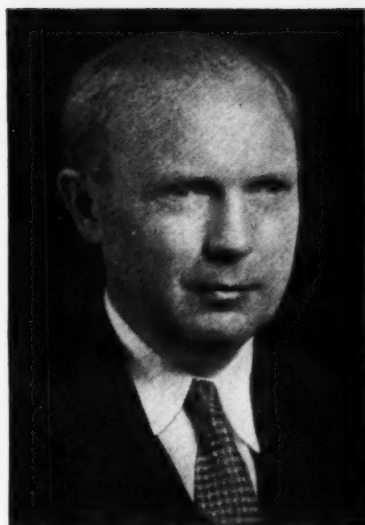


STANLEY S. A. WATKINS  
*of the Switching Apparatus Development Department completed thirty years of Bell System service on Sept. 24*

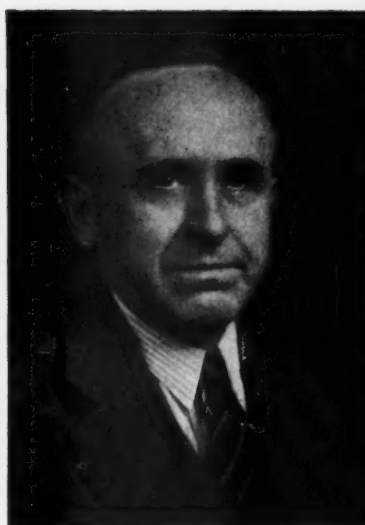
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October 1942





*Leland C. Roberts*



*Clarence R. Steiner*



*John C. Jeskie*

of the Telephone Pioneers of America. Residents of East Orange, the Steiners have two daughters. The older daughter graduated from Newark State Teachers' College in 1941 and now teaches at Chatham. The other daughter is now a freshman at Middlebury College.

\* \* \* \* \*

SOON AFTER J. C. JESKIE joined the Engineering Department of the Western Electric Company as a sheet metal worker in 1917 he joined the U. S. Army in which he served for nearly two years. After training in this country he was sent to England and then went to France with the 25th Engineers. After the Armistice he returned to the Development Shop where he soon became a supervisor of the sheet metal group. In May, 1934, he transferred to the Building Shop and was placed in charge of the pipe fitters, millwrights and sheet metal workers. His responsibilities cover the moving of heavy machinery, the installation of all machinery, the construction of frames and general sheet metal work, and the installation of all piping systems. Among the more important projects he has handled have been the building of the copper shielded rooms in the Graybar-Varick building, the ventilating systems for the blueprint and photostat rooms in the Davis building and, more recently, the duct system for the new blueprint room at West Street.

Mr. and Mrs. Jeskie live in Floral Park and have one married daughter. Gardening

and flowers are Mr. Jeskie's main hobbies. Gasoline rationing has curbed his extensive vacation tours—the Chicago Fair, Florida and Maine. He is active in fraternal affairs and is a member of the Telephone Pioneers.

\* \* \* \* \*

L. D. PLOTNER assisted in the work of reconditioning the flooded step-by-step unattended office at Portville, New York.

E. W. HANCOCK and C. H. McCANDLESS visited Philadelphia in connection with No. 4 toll board.

R. J. GUENTHER appeared before the Board of Interference Examiners at the Patent Office in Richmond in interference proceedings.

VISITORS TO THE LABORATORIES are today less frequent than in peace times but many of those who come are concerned with important military projects. Those so concerned must have clearances before they can visit laboratories, shops and drafting rooms or discuss such projects in offices. These clearances come from various military, naval and governmental authorities. To handle these matters K. B. DOHERTY has been appointed Visitor Clearance Representative reporting to L. S. O'ROARK, Assistant Director of Publication.

ON AUGUST 31 the Purchasing organization of the Laboratories was transferred from the Commercial Relations Department to the General Service Department.

G. F. FOWLER, on August 24, was appointed Plant Relations Manager. Mr.

There's enough steel used  
in making one auto to make  
26 heavy machine guns.

Fowler will continue his present responsibilities as Coördinator of Emergency Protection.

J. CAMERON was transferred to the Plant Operations Department on August 24 where he will handle matters concerning access to Laboratories premises.

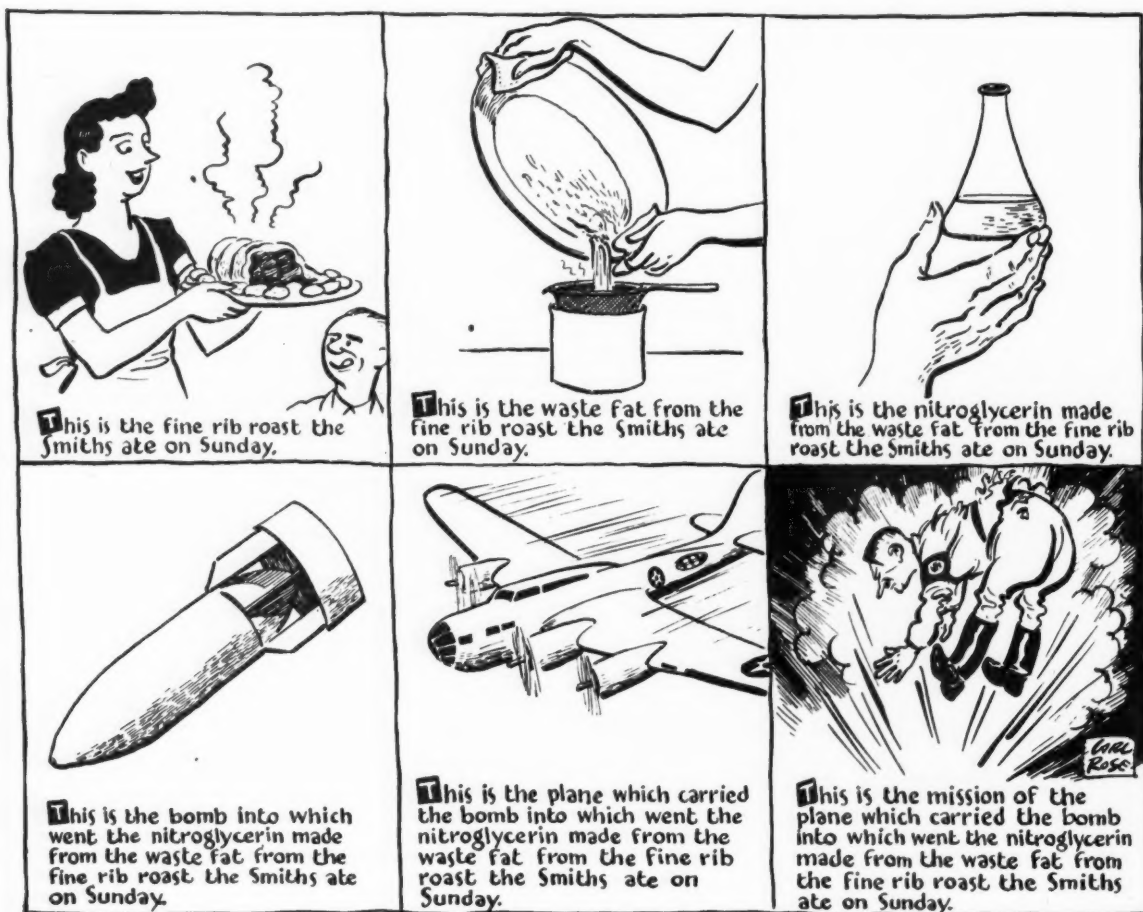
A. L. JONES, who is in charge of the Shipping Department, recently completed a week's intensive course at the Forest Products Laboratory, Madison, Wisconsin, in methods of proper packaging for shipments. The course covered the proper design of boxes, crates and other containers; peculiarities of their constituent materials; methods of identifying; water-proofing and preserving shipments; and other information pertinent to packaging and shipment. The Ordnance Department of the U. S. Army has

given much attention to the problem, particularly from the standpoint of the unusual hazards encountered in transportation, the need to conserve lumber and other materials and the even greater need to save shipping space; and has made available through the Forest Products Laboratory this course which is repeated at frequent intervals.

#### OBITUARIES

A. H. RICHARDSON of the Equipment Development Department died suddenly on the sixth of September. Mr. Richardson graduated from Worcester Polytechnic Institute in 1916 with the degree of B.S. in Electrical Engineering. Early in 1918 he enlisted as a private in the U. S. Army, attended officer's training school and at the close of the war was a Second Lieutenant in the 64th Field Artillery stationed at Camp Kearny, San Diego, California.

With the Laboratories, which he joined in 1920, he had been concerned with the development of central-office power apparatus



and the preparation of general power standards. His first work was on the development of engines and rectifiers for power supply followed by a period on power equipment control. For the past fifteen years he had been associated with the preparation of Bell System Practices covering a variety of power equipment used in telephone central offices. During the past year he had spent most of his time on the application of information to apparatus supplied to our armed forces.



ALLEN H. RICHARDSON  
1893-1942



MRS. MARGARET M. KELLY  
1910-1942

Mr. Richardson lived in Westfield, N. J. He is survived by his wife, Caroline, and two sons—Vance, a member of the Enlisted Reserve Corps and a senior at Middlebury College, Vt., and Harold, a senior in high school. He was very active in church affairs and Boy Scout work and was a member of the Table Tennis and Motion Picture Clubs at the Laboratories.

\* \* \* \* \*

MRS. MARGARET M. KELLY, a technical assistant in the Systems Development Department, died on August 22. Mrs. Kelly joined the Department of Development and Research of the A T & T in 1925 as a messenger but a few months later became a computer in the telegraph transmission

group. She left the company in 1932 and then came to the Laboratories in the fall of 1934 as a computer in the transmission theory and telegraph group. Since 1940 she had been doing similar work for engineers in the Davis building and, more recently, the Graybar-Varick building.

\* \* \* \* \*

PERHAPS UNWITTINGLY, the Bell Laboratories have made life easier for fledglings of the Royal Canadian Air Force. According to the *Monetary Times* of Toronto: "The Mirrophone, that magic device which records your telephone voice and plays it back so you can hear yourself as others hear you, has already changed the Canadian scene.

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#### MEMBERS OF THE LABORATORIES TO WHOM PATENTS WERE ISSUED DURING THE MONTHS OF JULY AND AUGUST

H. H. Abbott	N. I. Hall (2)	A. A. Lundstrom	G. Sandalls, Jr.
W. M. Bacon	W. R. Harry	J. B. Maggio	S. A. Schelkunoff
D. T. Bell	G. Hecht	W. P. Mason (3)	F. J. Scudder
W. M. Bishop	R. A. Heising	M. B. McDavitt	W. M. Sharpless
W. L. Bond	C. N. Hickman	B. McKim (2)	W. G. Shepherd
N. Botsford	L. Hochgraf	N. C. Norman	A. M. Skellett (2)
A. J. Busch (2)	W. H. T. Holden	H. Nyquist (2)	G. R. Stibitz (2)
J. O. Edson	A. G. Jensen	I. C. Osten-Sacken	H. E. Vaughan
W. B. Ellwood	C. D. Koechling	C. A. Parker	E. G. Walsh
E. B. Ferrell (2)	E. Lakatos (2)	K. W. Pfeiffer	H. Weinhardt
T. C. Fry	F. A. Leibe	A. Raynsford	L. R. Wrathall
C. S. Fuller	W. J. Leveridge	H. T. Reeve	C. S. Yeutter
R. E. Graham (3)	B. F. Lewis	P. A. Reiling	F. A. Zupa
F. Gray			



The air force has used the machine for some months. The R.C.A.F. instructors speak already in gentler tones to their lowly rookies . . . one was even scared close to prostration when he accidentally heard himself in action. Since Mirrophone entered his life he has been known to say 'please.' "

BEGINNING OCTOBER 1, the American Telephone and Telegraph Company's temporary Fifteen Year 3 Per Cent Convertible Debenture Bonds due September 1, 1956, are exchangeable for definitive Debenture Bonds at the office of the Trustee, City

Bank Farmers Trust Company, 22 William Street, New York, N. Y. The definitive coupon debenture bonds will have the March 1, 1943, and all subsequent interest coupons attached. Before sending the temporary bonds to the Trustee for exchange, the March 1, 1942, and September 1, 1942, interest coupons should be detached and presented for payment through the usual banking channels or to the Company direct.

THE EDWARD J. HALL CHAPTER of the Telephone Pioneers will hold its fall meeting in the Hotel Commodore on November 8.

## "THE TELEPHONE HOUR"

(NBC, Monday Nights, 9:00 P.M., Eastern War Time)

### OCTOBER 5, 1942

Malagueña	Orchestra	<i>Lecuona</i>
Huella		<i>Aguirre-Heifetz</i>
Preludio		<i>Valle-Heifetz</i>
Moth Circling Around the Light		<i>Villa-Lobos</i>
	Jascha Heifetz and Orchestra	
Afro-American Symphony—Scherzo		<i>Still</i>
	Orchestra	
Jeannie with the Light		
Brown Hair		<i>Foster-Heifetz</i>
A La Valse		<i>Herbert</i>
Prelude No. 1		<i>Gershwin-Heifetz</i>
	Jascha Heifetz and Orchestra	
Star-Spangled Banner		<i>Traditional-Arr. Heifetz</i>
	Jascha Heifetz and Orchestra	

### OCTOBER 12, 1942

If There Is Someone Lovelier		<i>Schwartz</i>
Than You		
	James Melton	
Get Out and Get Under		<i>Abrahams</i>
	Orchestra	
When I Have Sung My Songs		<i>Charles</i>
Thy Sweet Singing		<i>Olmstead</i>
	Helen Jepson	
Home on the Range		<i>Traditional-Arr. Guion</i>
	James Melton	
Autumn Frolics from		
"Woodland Fancies"		<i>Herbert</i>
	Orchestra	
Duet from "Natoma"		<i>Herbert</i>
	James Melton, Helen Jepson and Orchestra	

### OCTOBER 19, 1942

Heigh-Ho from "Snow White and the Seven Dwarfs"		<i>Churchill</i>
	Orchestra	
The Star		<i>Rogers</i>
Joy		<i>Cadman</i>
	Grace Moore	
Clair de Lune		<i>Debussy</i>
	Orchestra	
Mah Lindy Lou		<i>Strickland</i>
Forgotten		<i>Cowles</i>
	Grace Moore	

Polonaise from Scènes de Ballet	<i>Glazounow</i>
Orchestra	
Ciribiribin	<i>Pestalozzi</i>
	Grace Moore

### OCTOBER 26, 1942

Toreador Song from "Carmen"	<i>Bizet</i>
John Charles Thomas and Chorus	
Underneath the Stars	<i>Spencer</i>
	Orchestra
I Heard a Forest Praying	<i>de Rose</i>
John Charles Thomas	
Rondo Capriccioso	<i>Saint-Saëns</i>
	Orchestra
Gilbert and Sullivan Medley	<i>Sullivan</i>
John Charles Thomas, Chorus and Orchestra	

### NOVEMBER 2, 1942

My Heart Stood Still from	
"The Connecticut Yankee"	<i>Rodgers</i>
Oh! What a Beautiful City	<i>Spiritual-Arr. Boatner</i>
	James Melton
A Kiss in the Dark	<i>Herbert</i>
	Orchestra
O Cease Thy Singing Maiden Fair	<i>Rachmaninoff</i>
Mexican Serenade	<i>Sacco</i>
	James Melton
Roumanian Rhapsody	<i>Enesco</i>
	Orchestra
Recondita Armonia from "Tosca"	<i>Puccini</i>
	James Melton

### NOVEMBER 9, 1942

El Capitan	<i>Sousa</i>
	Orchestra
Norwegian Rustic March from	
"Lyric Suite"	<i>Grieg</i>
Preludes No. 1 and No. 7	<i>Chopin</i>
Empress of the Pagoda from	
"Mother Goose Suite"	<i>Ravel</i>
Impression	<i>Templeton</i>
	Alec Templeton
Perpetuum Mobile	<i>Paganini</i>
	Orchestra
Finale from Second Concerto	<i>Rachmaninoff</i>
Alec Templeton and Orchestra	



## A New Telephone Set for the Hard of Hearing

By ALFRED HERCKMANS  
*Station Apparatus Development*

**F**OR a number of years the Bell System has had apparatus for association with the regular telephone set to assist the hard of hearing. Known as the 10A key equipment, it consists of a vacuum tube amplifier, a box for the filament and plate battery, and a third unit containing a volume control key and switch. This apparatus has given satisfactory service in many installations. Recently a new amplifying set has been developed which permits all the added equipment except a small  $4\frac{1}{2}$ -volt battery to be incorporated in the base of the telephone. The gain

of the amplifier is adjusted by turning one of the switchhook plungers, and the amplifier can be disconnected by a second switch controlled by this same plunger. The new set is available in two forms, coded the 332-type and 334-type telephone sets, whose differences pertain only to the type of lines on which they will be used.

In appearance the new amplifier set is like any other of the combined type hand telephone sets, as may be seen from the photograph at the head of this article. The switchhook plunger at the right, which the girl is adjusting, gives gain control. This may



*Fig. 1—In the new subset, the amplifier occupies a space less than one of the bells*

be turned to any one of three positions, marked L, M and H, to give low, medium or high gain. Vertical motion of this plunger removes the amplifier from the circuit entirely. The contacts controlled by this vertical motion may be wired in either of two ways. If the set is to be used chiefly by one who is hard of hearing, the wiring is arranged so that the amplifier is normally in the circuit and is removed by pulling the plunger up. When the set is to be used by a number of persons, some of whom are not hard of hearing, the wiring is arranged so that the plunger has to be pulled up to connect the amplifier into the circuit. When the handset is replaced after using, the plunger is returned to its normal position.

Two elements have contributed to the small size of the new set. One is the compact design of the volume and control spring assemblies operated by

the set is resting. When the amplifier is in use its receiver element is connected in place of the regular handset receiver, while its transmitter element is connected to the handset receiver in series with a  $4\frac{1}{2}$ -volt battery which may be placed in any convenient location and connected to the set by two wires. With this arrangement, the handset receiver is operated by the amplified speech from the transmitter element of the amplifier.

The major circuit elements of the amplifier set are indicated in Figure 2. The key marked KI is operated by the vertical motion of the switchhook plunger above its position when the handset is lifted. In one position, the receiver of the handset is connected to the induction coil in the usual manner, and the amplifier is disconnected. In the other, the one indicated, the handset receiver is connected to the

\*RECORD, September, 1939, page 8.

the switchhook plunger. The other is the very small amplifier unit employed. This is a modification of the amplifier used with the ortho-technic audiophone, and has already been described in the RECORD.\* It consists of a granular-carbon microphone whose diaphragm is actuated by a bipolar receiver element using permanent magnets. Its appearance and location in the set may be seen in the front right hand corner of Figure 1. A soft rubber mounting prevents it from picking up vibrations from the surface on which



output of the transmitter part of the amplifier and the receiver part of the amplifier is connected through a  $\pi$  resistance network to the terminals of the induction coil normally connected to the handset receiver. The  $\pi$  network in the connection to the amplifier receiver gives the gain control. As arranged on the schematic, the network gives maximum loss, and thus the lowest net amplifier gain. When the plunger is turned to the M position, the resistance c is connected in parallel with B instead of with D. When the plunger is turned to the H position, c remains in parallel with B, but a short circuit is placed from the input of B to the output of A, and D is disconnected at its lower end. This entirely cuts out the resistance pad and gives maximum gain. Since only a small amount of power is dissipated by these resistances, they are very small and require very little space.

Since to prevent "singing" the amount of gain around the closed path from the receiver to the transmitter through the air path and then back to the receiver through the induction coil must be less than the total loss,

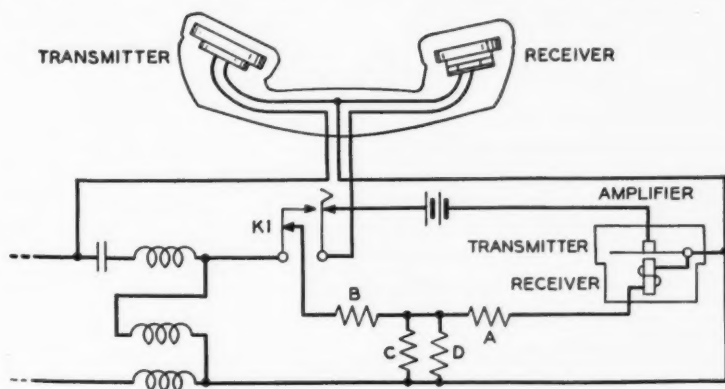


Fig. 2—Simplified schematic of amplifier set

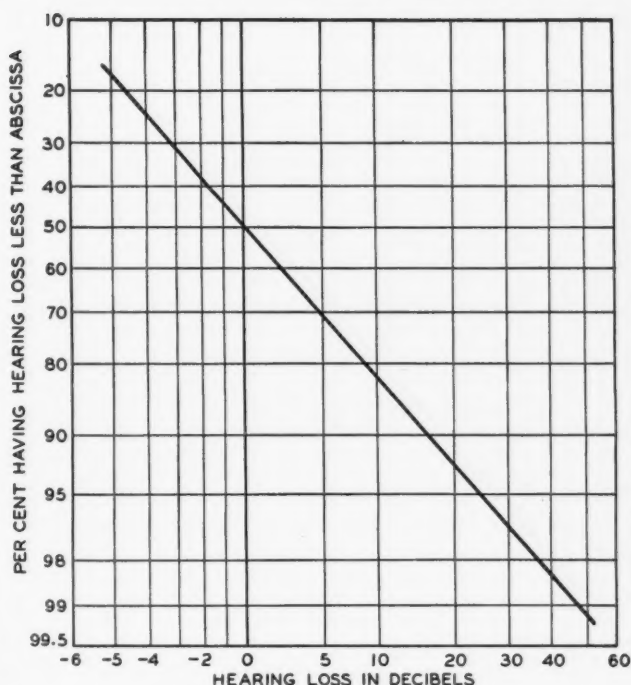


Fig. 3—Distribution of hearing loss at 1760 cycles

the amount of gain that can safely be introduced into the receiver path of a telephone set is limited. A maximum of 25 db gain is provided by the amplifier used, and while this is great enough to cause singing if the handset is held away from the ear and facing a reflecting surface such as the top of a desk, singing will not occur in normal use.

Interesting information regarding the field of use of such a hearing aid may be derived from the hearing tests made in the Bell System Exhibit at the New York World's Fair in 1939. The extent of hearing loss of a cross-section of the public from 10 to 59 years of age is given in Figure 3. The loss will be different at different frequencies, of course, but that shown, which is at 1760 cycles, may

be taken as typical. The reference loss of 0 db is that of the group from 20 to 29 years of age. A person is not conscious of hearing impairment for ordinary room conversations until his loss is about 25 db, and thus as is shown by the curve only about 5 per cent of the population would be conscious of the need for a hearing aid. This percentage would be smaller for telephone conversations because the average speech level received is approximately 10 db higher than that of

normal direct conversation. In other words, the ordinary telephone set acts as a hearing aid. With the additional 25 db provided by the new set, persons with as much as 60 db loss will receive adequate volume. Since only 0.5 per cent have a loss greater than this, the new set provides the help needed for about 90 per cent of those conscious of hearing impairment, and would undoubtedly give worthwhile assistance to many with losses in excess of this.

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*Today, our great laboratories are engaged almost wholly in devising tools to destroy the anti-social, anti-scientific forces that threaten to stop the progress of scientific endeavor throughout the world.*

*When that task is done, industrial research will revert to its peaceful pursuits. As education in science expands, more workers in more lands will join the ranks of explorers who are widening the bounds of human knowledge. A new and larger crop of young scientists will bring forth the products on which new industries will be built. The welfare of all will be advanced to the detriment of none. Science demands a free world, and the workers in science will win it.*

*From a world-wide broadcast by  
Dr. Buckley for the American  
Philosophical Society over  
WRUL, July 10, 1942.*

# An Automatic Teletypewriter Switching Office

By G. J. KNANDEL  
*Telegraph Development*

THE teletypewriter exchange network,<sup>1</sup> over which the Bell System has furnished nation-wide service during the past ten years, has been operated, until recently, entirely on a manual basis. In the larger cities the Nos. 1<sup>2</sup> and 1A<sup>3</sup> multiple-type switchboards are provided; in the medium-sized cities the No. 3A<sup>4</sup> multiple-type switchboard is used, while the No. 5<sup>5</sup> non-multiple-type switchboard is available for service at the smaller switching centers. In addition, modified telegraph test boards have been used at the smallest centers when the traffic is not sufficient to justify a switchboard designed only for TWX service. As traffic at these latter points has increased, No. 5 switchboards have been installed in some cases. Recently, however, an automatic switching arrangement has been developed that is suitable for some of the smaller switching centers that require trunks to only one or possibly two larger switching offices.

It is known as the 101A teletypewriter line concentrating unit, and is applicable where there are not more than 100 subscriber lines in one lo-



cality nor more than twenty trunks. This unit employs crossbar switches to make connections between the local lines and the trunks to the "operator" office where the necessary manual switching is done. In other words, the lines connected to the automatic unit are concentrated from a service standpoint and the term "line concentrating unit" is thus truly descriptive of the function performed.

In general, it will be more economical to install a line concentrating unit rather than a manual switchboard when the capacity of 100 lines and 20 trunks is expected to be adequate for the office for a reasonable period, when the geographical location and flow of traffic is such that only one, or at the most two, trunking outlets are

<sup>1</sup>RECORD, Jan., 1938, p. 167. <sup>2</sup>Jan., 1932, p. 145.  
<sup>3</sup>Oct., 1937, p. 34. <sup>4</sup>Jan., 1936, p. 146. <sup>5</sup>Jan., 1938,  
p. 171.



necessary, when no through switching is involved that cannot readily be handled at some other center, and when the amount of traffic between local stations is negligible. If there is a considerable amount of local traffic, or if the toll traffic cannot readily be handled over one or two groups of

Figure 1. Ordinarily ten trunks are sufficient to handle the initial traffic at these small offices.

With this arrangement, it is necessary only to operate the select magnet corresponding to the trunk and the hold magnet corresponding to the line to establish a connection. Calls are established at the concentrating unit one at a time, and an incoming call receives preference over an outgoing call when two such calls are received at the unit simultaneously. Actually the number of simultaneous calls is so low that the delay caused by this arrangement is insignificant. The trunk sequence circuit routes incoming calls to the director, while the line sequence circuit routes outgoing calls to the trunks through the trunk sequence circuit. These circuits, together with the operating paths to and from them, are shown in light lines in Figure 1.

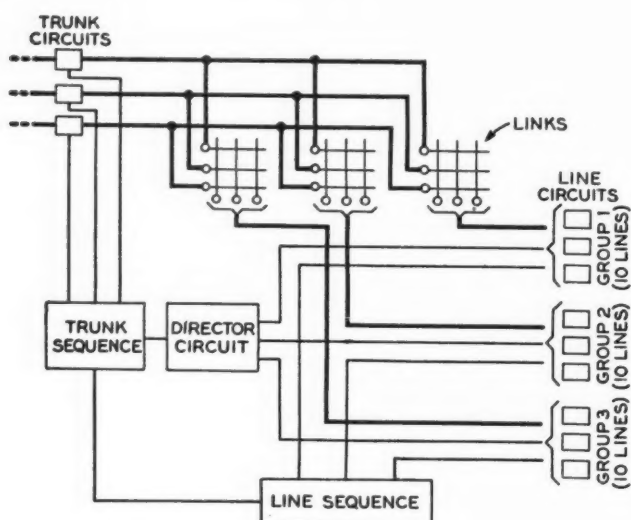


Fig. 1—Simplified block schematic of the 101A line concentrating unit

trunks, the need for a local operator is greater and a manual switchboard will ordinarily be used.

With the new 101A concentrating unit, each set of ten lines is connected to the verticals of a crossbar switch, which serves as a link, and up to ten trunks may be connected to the switch horizontals, which are multiplied between switches. If there are more than ten trunks, an additional group of switches is required to provide horizontals for terminating the additional trunks. The verticals of the added switches are multiplied to the verticals of the switches terminating the first ten trunks so that all lines may have access to all trunks. The general arrangement is indicated in simplified form in the upper part of

Outgoing calls, after passing through the line sequence circuit, which insures their being handled one at a time, pass to the trunk sequence circuit. When an incoming call is being established, the outgoing call will be delayed here until the incoming call has released the trunk sequence circuit, after which an idle trunk is selected. Because of the relatively short holding time of the sequence circuit, there is usually no delay. When an idle trunk is selected, a signal is sent to the distant operator. A return signal from the distant office then operates the select magnet of the crossbar switch and this in turn operates the hold magnet of the calling line. The sequence circuit is then released and is free to route another call.

Incoming calls are passed on to the director by the trunk sequence circuit, which insures their being handled one at a time. The director, when a call reaches it, sends a signal back over the trunk to tell the operator at the distant end to type the number of the line she wants. This number is received by a distributor, which forms part of the director circuit, is decoded from the teletypewriter signals, and a test is made to determine whether the line wanted is available. The select magnet corresponding to the calling trunk on the crossbar switch is operated when the call comes in; and if the line is available, the hold magnet corresponding to the line is operated by the director, thus completing the connection. The director is then released and is free to handle the next incoming call routed to it. The trunk sequence circuit is also released and the unit is free to handle other inward or outward calls. Subscriber ringing is normally done automatically by the line concentrating unit, but may be done manually from the operator office. In special cases, such as ringing unattended stations which require a much longer ringing interval instead of the usual automatic machine ringing, the operator always rings.

Conference service may also be

furnished at a No. 101A unit. When it is used, the operator first transmits a number assigned to the conference circuit. Then over a second trunk she reaches the desired subscribers, one after another, and transfers them to the conference circuit by sending a special signal. After the last subscriber has been transferred the second trunk is released. Practice connections for subscribers connected to the 101A unit are set up manually by an attendant at the line concentrating unit office upon request from an operator, who receives the request from the subscriber. After the connection has been set up, the subscriber may disconnect from the practice circuit to answer an incoming call or to originate an outgoing call before the manual patch is taken down by the attendant.

A No. 101A concentrating unit installed at Scranton, Pa., is shown in the photograph at the head of this article. Five crossbar switches, with their control circuits beneath them, are evident in the second bay from the right. A sixth switch, not evident in the photograph, is on the fourth bay. The various control and sequence circuits, the trunk circuits, TLX circuits, and the testing circuits are mounted on the other three bays of

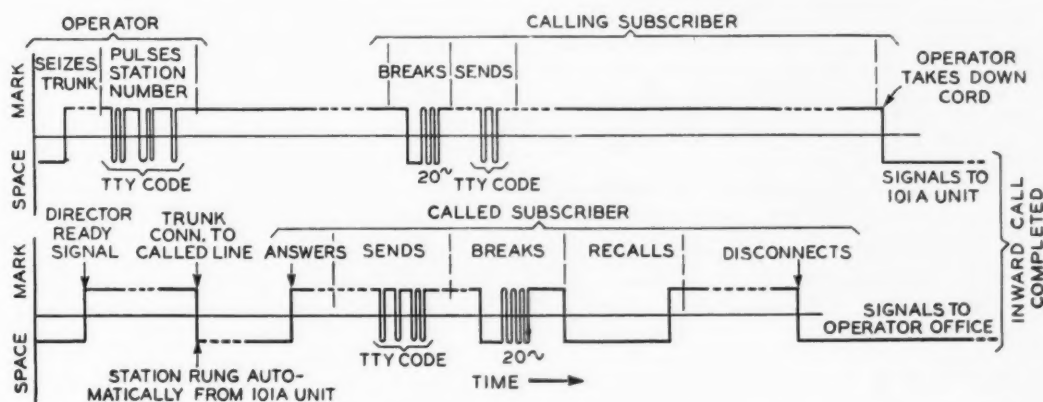
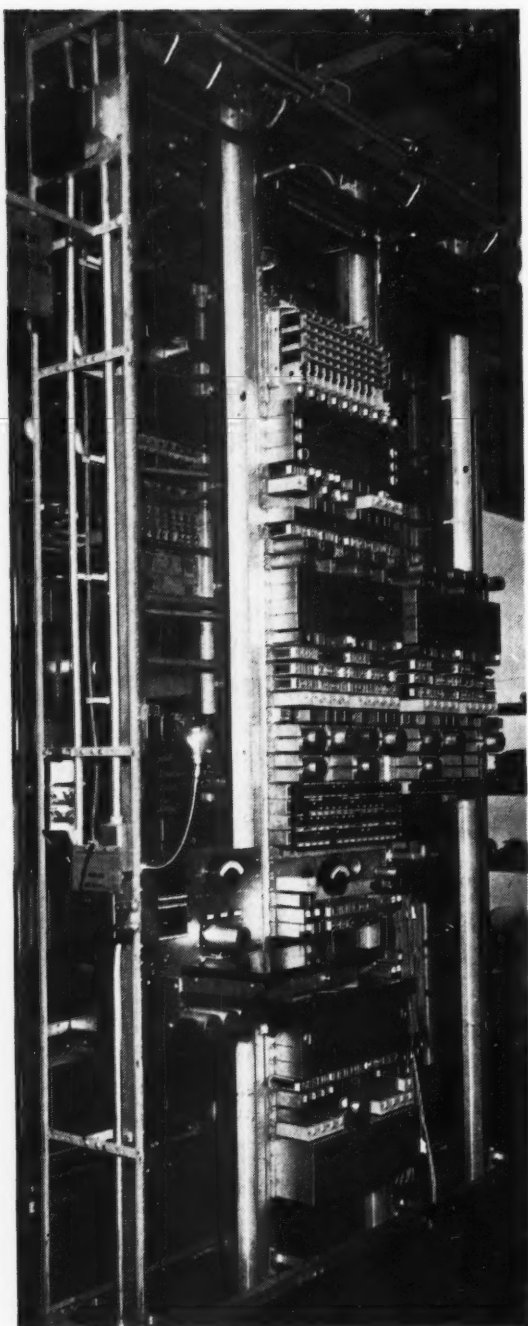


Fig. 2—Typical inboard and outboard signals for an incoming call to a 101A unit



*Fig. 3—The 102A line concentrating unit which has been designed for small installations as installed at Baton Rouge*

the installation. Jacks are included on the bays to permit switching to be done manually in case of emergencies.

In the crossbar telephone system the selecting signals sent by the sub-

scriber are dial pulses, while transmission takes place at voice frequency. With the 101A system, teletypewriter signals are used both for selecting purposes and for transmission. The trunk circuits between the 101A unit and the operator office are operated on a "full-duplex" basis; that is, signals may be sent in one direction independently of signals sent in the opposite direction. Subscriber communication over these trunks takes place on a "half-duplex" basis; that is, any subscriber may either send or receive but cannot do both simultaneously. Figure 2 shows the signals transmitted between the 101A unit and the operator office for a typical inward call.

The upper line of Figure 2 represents the signals transmitted to the 101A unit, and the lower line, those transmitted to the operator office. While the trunk is idle, the path in each direction is "spacing." When the operator seizes the trunk, a "mark" is sent to the 101A unit, which results in connection of the trunk to the director if no other call is being established. The director then returns a mark to signal the operator to transmit the number she wants. As the operator transmits the number, the director decodes it, establishes the connection and then a space is sent to the operator. This space lights her cord lamp, as an indication to ring in those special cases where the operator rings. When the subscriber answers, the outward path returns to marking, giving the proper lamp signal to the operator. The called subscriber then types the firm's name to indicate that he is ready, and the calling subscriber transmits his message. A "break" signal in either direction is a half-second space followed by twenty-cycle reversals. A recall is a two-second



space, which causes the operator's cord lamp to flash. A disconnect is a continuous space, which causes the operator's cord lamp to light steadily, indicating that the connection should be taken down. Had the called line been found busy, signals would have been returned to the operator to indicate the fact.

At the present time, fourteen line concentrating units have been installed and nine more are on order. The locations of the present and proposed installations are shown in Figure 4. Some of the present installations are of the 101 type, which preceded the 101A, but the general method of operation is the same for both. Experience with these installa-

tions has indicated the feasibility of establishing teletypewriter connections on an automatic basis.

Recently a teletypewriter line concentrating unit, suitable for use in small installations, has been made available. One of the first installations, at Baton Rouge, La., is shown in Figure 3. This concentrating unit, known as the 102A, is similar in essential functions to the 101A unit. It serves a maximum of thirty lines, with six trunks extending to one or two operator offices. The unit shown mounts the director, ten lines, and two trunks on the center bay, and two additional trunks on the right-hand bay. The left-hand bay, not a part of the unit, mounts a relay test panel.



Fig. 4—Locations of the 101 type installation now in service or on order



## 3A Code-Call Circuit

By E. L. ERWIN

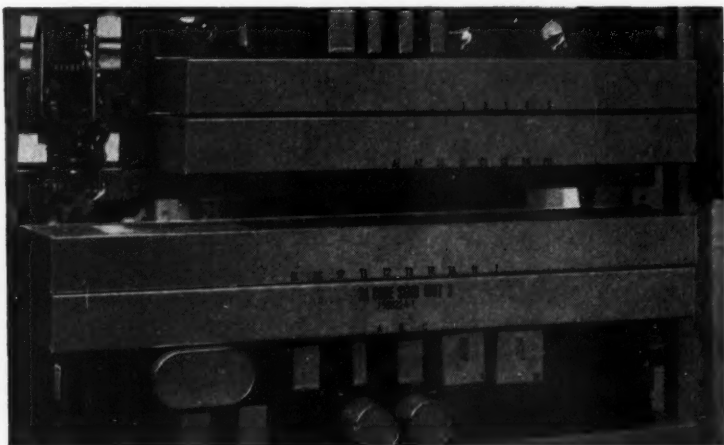
*Switching Development Department*

**T**O PROVIDE a convenient method of calling employees to the telephone when they are away from their regular telephone, the 3A code-call circuit has recently been developed by the Laboratories for private branch exchanges using the dial system. Each employee who should be accessible to telephone calls when away from his desk is assigned a three-digit number using only digits from 1 to 5, and when he is wanted on the telephone, the code-call circuit sounds his code on bells, chimes, or horns throughout the entire establishment. On hearing his code, the employee will go to the nearest phone, dial a number assigned to the code-call circuit, and will be automatically connected to the line calling him.

The code-call equipment is arranged in two parts. One is a terminal circuit and the other is the code-sending circuit. The terminal circuit has two line numbers associated with it—a single-digit number is used for calling, and a regular PBX station number for answering—and includes a relay by which it connects itself to the code-sending circuit. This latter circuit has three selectors on which are registered the three digits of the code to be called, and a fourth selector that in conjunction

with a group of relays sends out the code call under control of the three digits set up on the register selectors. There is only one of the code-sending circuits for each installation, but for the larger PBX's, there may be two of the terminal circuits so that while one is in use after a call has been answered, the other may be used for sending out another call.

A simplified diagram of the overall arrangement is shown in Figure 2, and a schematic of the terminal circuit in Figure 3. When a call is made to the code-call circuit the calling line is connected—through the PBX switches or the switchboard jacks—to the left side of this terminal circuit, and the line answering the call will later be connected to the right side of the circuit. Communication between the two lines will pass through the repeat coil, one side of which is short circuited by a contact on relay SR until



*Fig. 1—Equipment for the 3A code-call circuit*

The terminal circuit performs several functions. It first provides access to the code-sending circuit through relay c, and then provides for repeating the code pulses to the registers by relay A. It also provides, through the operation of c and SR, a path from the code-sending circuit to the calling line over which is transmitted a tone signal corresponding to the code being called. The person calling may thus hear tone signals corresponding to the code being sounded. When the call is answered, relays TR and D provide for establishing a talking path between the two lines and dissociating the code-sending circuit.

a back contact on relay D and front contacts of relays SR and B. With C operated, a connection is established to the dial register of the code-sending circuit through a back contact of relay A, which follows the pulses of the code dialed and causes the three digits to be registered. Relay B, which has slow-release characteristics, remains operated from a front contact of relay A during and after the dialing of the code.

The code-sending circuit sends out the call, repeating it five times unless the call is answered before that time. At the end of the fifth call, if no answer has been received, a connection will be made to the switchboard attendant, who will come in on the circuit to find out whether the call should be repeated for another five cycles. When the call is answered, the responding line is connected to the right side of Figure 2, and relay TR is operated. This relay operates relay D, thus opening the operating circuit of SR and C, and closing the talking circuit. Although the operating circuit of C is opened, this relay is held operated from the code-sending circuit, and will not release until the cycle of calls being sent is completed. This prevents the sounding of a wrong code number

when a call is answered before the code cycle is completed. The continuing operation of the code-sending circuit has no effect on the conversation, however, since the tone lead has been opened by the release of relay SR.

The major elements of the code-sending circuit are shown in Figure 4. At the upper left are the three selectors on which the code digits are registered, but the operating circuit associated with them is omitted.





As the pulses for the first digit come in, the "A" selector makes one step for each pulse, so that if the first digit were 3, the selector would stop on terminal 3. Selectors B and C act similarly for the two following digits. Each of these selectors grounds one terminal of the bank of the D selector that controls the calling signals, as indicated by the corresponding numbering, as soon as the last digit has been recorded, an open circuit in the start lead from the C relay of the terminal circuit is closed, and the stepping magnet of the selector D begins stepping the selector around.

This stepping is brought about by the interaction of relay SL and magnet D, and the selector moves one step each time D releases. Ground is connected to the start lead at relay C, and operates SL through a back contact on D. It then operates D through a front contact of SL. Operation of D releases SL, and the release of SL releases D—moving the selector one step, and allowing the same cycle to begin again. This stepping continues, and the selector rapidly moves around until it reaches the first terminal of bank 4 that has been grounded by the register selector. At this time relay SG will be operated from bank 4, and in turn will operate SP. The operation of this latter relay opens the start circuit to the SL relay, connects magnet D to a contact on T2, closes a hold

circuit from bank 3 to SG and one from bank 1 to SP, and connects ground to the winding of T1 through a back contact on T3.

Relays T1, T2 and T3 operate and release in sequence: T1 operates T2,

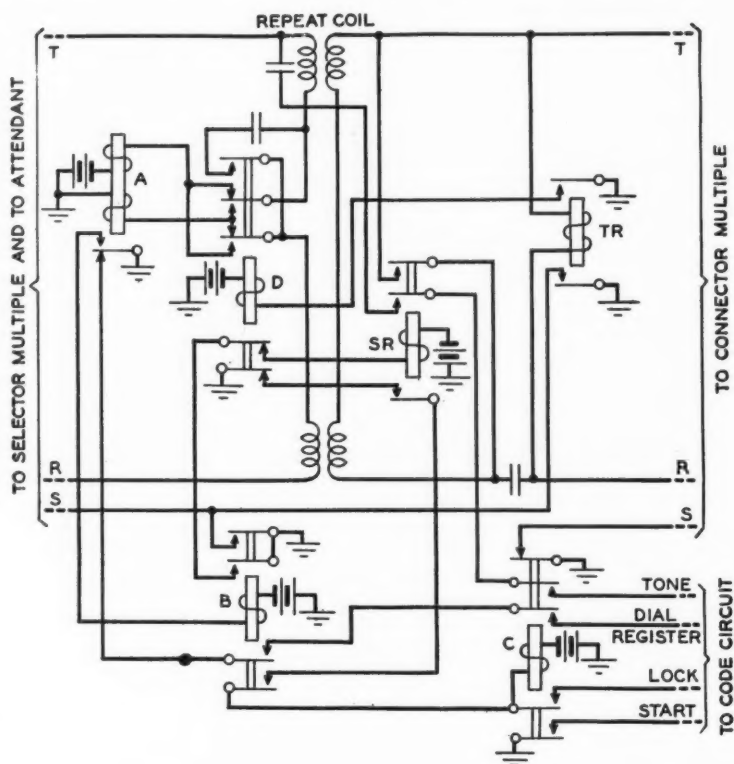


Fig. 3—Simplified schematic of the terminal circuit. Either one or two of these circuits may be provided

and T2 operates T3; and the operation of T3 then releases T1, thus releasing T2 and T3 in sequence, and the release of T3 operates T1—thus starting another cycle. Each time T2 operates, the stepping magnet D is operated, and each time T2 releases, the stepping magnet is released, thus moving the selector one step. While T2 is operated, the code call signal is sent out through a front contact of SG, and a tone is sent to the terminal circuit through another front contact of the same relay.

When the sixth step of the selector

is reached, however, no ground is found on bank 3, and relay SG releases. Relay SP is held, however, by ground on terminal 6 of bank 1. This stops both the code-call signal and the tone to the terminal circuit, but permits the operation of the T chain to continue until the selector D has taken one more step to give a pause between the first and second digits of the code. At terminal 7 of the selector, however, the conditions are the same as at terminal 1, and the selector moves rapidly again, under the control of SL and D, until the next grounded terminal is found on bank 4, which is that representing the second digit of the code. The operation for the second and third digits is the same as for the first, and from terminals 18 to 22, five cycles of the T relays are carried out to give a pause between consecutive

soundings of the code. If when terminal 22 is reached, the call has not been answered, relay c of the terminal circuit will be held operated through contacts of B, SR, and D, and a second sounding of the code will be carried out following the same sequence as for the first. If the call has been answered, however, and the operating circuit of c through SR is open, c will release at stop 22 because of the opening of its hold circuit on bank 2. With c released, the ground supply for bank 1, which is obtained from c, will be open. Under these conditions, all relays of the code-sending circuit will restore to normal, and in doing so will open the hold circuit for relay c, which will also release. If the call has not been answered after the completion of five cycles, a timing circuit, not shown on the diagrams, will

stop the code-sending circuit and signal an attendant to come in on the line.

Besides being accessible to calls from any of the PBX lines, the code-sending circuit may also be reached over dial repeating tie trunks by dialing from associated PBX's as from a local extension. It may also be used by the PBX attendant for completing incoming calls from a central office, or to save the time of an executive who wants to reach someone not at his desk. For this latter service, the executive merely asks the attendant to call the person he wants, and then

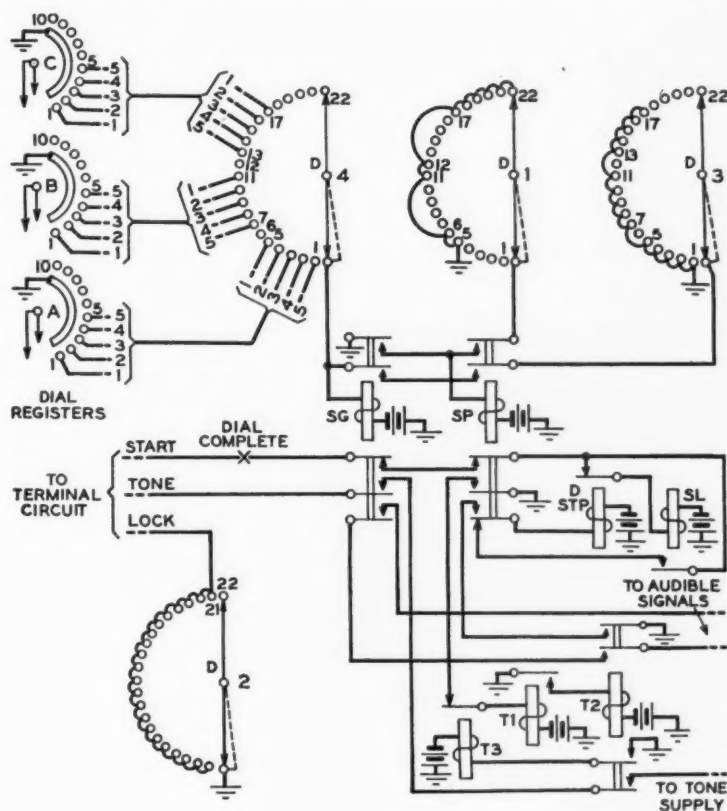


Fig. 4—Simplified schematic of code-sending circuit

hangs up. When the called party answers, the attendant connects the code-sending circuit to the executive's line, and then rings on it.

Signaling apparatus may be selected to meet the needs of each installation. Either of three lengths of

signals may be used: a half-second signal is used for quick-acting devices and either a one-second or a two-second signal for those of slower action, or for noisy locations. Completely automatic in action, the circuit should require a minimum of attention.

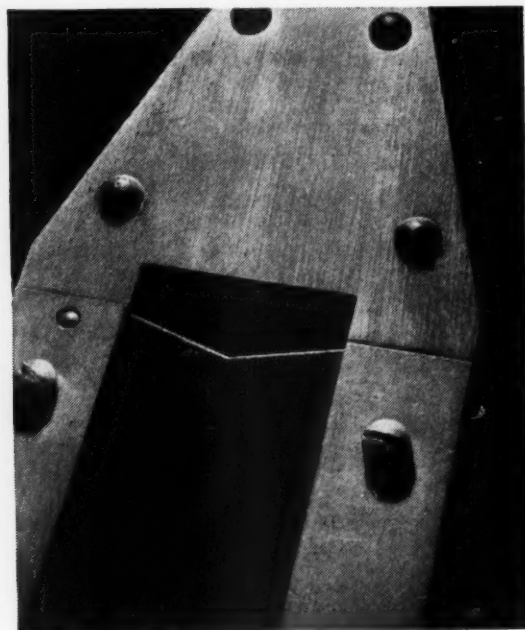
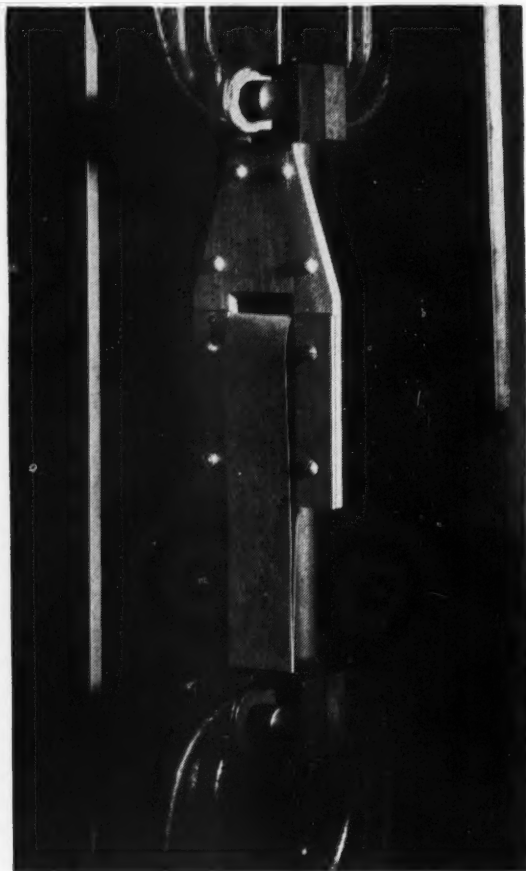
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## A Simplified Tear Test

**T**HE ability of paper or fabric to resist tearing is often an important characteristic. Methods of testing tear resistance have been in use for a long time, but for one reason or another they have not been entirely satisfactory; and the matter has been under investigation by the General Paper Committee of the American Society for Testing Ma-

terials. As a member of its Sub-Committee on Testing Methods, J. M. Finch, of these Laboratories, developed a testing device that is extremely simple to make and use, and at the same time promises to give satisfactory results that are readily reproducible. Known as the Finch edge-tear stirrup, it is being tried out by a number of manufacturing concerns and government agencies.

As evident in the accompanying photographs, the device consists of a metal plate, roughly Y-shaped, and about six inches long. This serves as the suspension bar and sides of the stirrup. The transverse member is a





metal plate only twenty-five thousandths of an inch thick and cut in a shallow v at the top. The upper edge of this v is recessed, and short lengths of twenty-five-mil drill rod are inserted to give the sides of the v a smooth cylindrical surface that will not cut the material under test.

A one-inch strip, of the paper or fabric, is passed through the stirrup, and its ends bent down and fastened to the lower jaws of any convenient form of tension testing machine. The suspension bar of the stirrup is fastened to the upper jaws of the tension

testing machine, and force is applied. Because of the v across which the test strip lies, the force is applied to the strip at its two edges. As the force is increased, the strip ultimately tears from the edges toward the center, and this force is used as a measure of the tear resistance.

To expedite war production by providing simpler testing facilities, the Laboratories is giving the specifications for the edge-tear stirrup to any concern that cares to make or use it. In this way, delay is avoided in taking advantage of this convenient device.

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## Contributors to this Issue

E. L. ERWIN, in 1918, received the B.S. degree from the University of Chicago. He joined the Installation Department of the Western Electric Company in 1921, and for the next three years was occupied in installing panel offices. Following this, he transferred to the Technical Staff of the Laboratories, where he was with the circuit laboratory until 1932. Since then, in the circuit design group, he has engaged in development work on both the panel and crossbar systems and, more recently, on PBX systems.

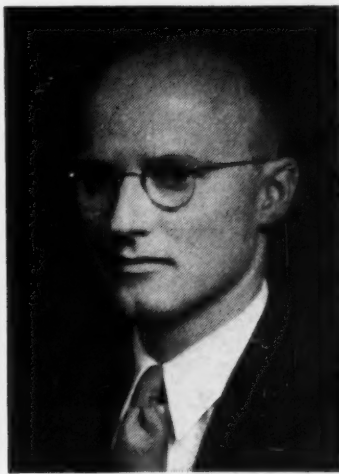
AFTER receiving the A.B. degree from Columbia University in 1922, ALFRED HERCKMANS spent two years in engineering study at the Massachusetts Institute of Technology, and then entered the Department of Development and Research in 1925. His first work was on problems associated with the introduction of the handset for subscribers' use. Since transferring to the Laboratories in 1934 he has continued his work on design requirements testing, and field trials of station apparatus.



*E. L. Erwin*



*Alfred Herckmans*



*G. J. Knandel*

G. J. KNADEL received the degree of E.E. from Cornell University in 1924 and immediately joined the Department of Development and Research of the American Telephone and Telegraph Company where he engaged in the development of teletypewriter private-wire switching arrangements and later of the TWX

system. Shortly after the 1934 consolidation, he transferred to the circuit group, and spent five years in the development of teletypewriter station arrangements. For the past two years he has again been concerned with the development of central-office teletypewriter exchange equipment.

